

CLERK'S COPY.

Vol. V

TRANSCRIPT OF RECORD

Supreme Court of the United States

OCTOBER TERM, 1938

No. 2

KELLOGG COMPANY, PETITIONER,

vs.

NATIONAL BISCUIT COMPANY.

No. 56

KELLOGG COMPANY, PETITIONER,

vs.

NATIONAL BISCUIT COMPANY.

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT
OF APPEALS FOR THE THIRD CIRCUIT.

PETITIONS FOR CERTIORARI FILED { SEPTEMBER 10, 1937.
MAY 23, 1938.

CERTIORARI GRANTED MAY 31, 1938.

TRANSCRIPT OF RECORD

(IN FIVE VOLUMES)

IN THE
UNITED STATES CIRCUIT COURT OF APPEALS
FOR THE THIRD CIRCUIT

No. 5801.

October Term, 1935.

NATIONAL BISCUIT COMPANY,

Plaintiff-Appellant,

v.

KELLOGG COMPANY,

Defendant-Appellee.

Volume V. EXHIBITS.

(Pages 1 to 516 inclusive)

APPEAL FROM THE DISTRICT COURT OF THE UNITED
STATES FOR THE DISTRICT OF DELAWARE.

Filed August 10, 1935.

DEFENDANT'S EXHIBITS.

	Admitted Vol. Page	Printed Vol. Page
Book of Patents Issued to Plaintiff, Viz.:		
Perky & Ford U. S. Patent No. 502,378, August 1, 1893	II 1166	V 1
Perky U. S. Patent, No. 520,496, May 29, 1894	II 1166	V 5
Perky U. S. Patent No. 532,286, Janu- ary 8, 1895	II 1166	V 11
Perky U. S. Patent No. 532,480, Janu- ary 15, 1895	II 1166	V 15
Perky U. S. Patent No. 532,481, Janu- ary 15, 1895	II 1166	V 21
Perky U. S. Patent No. 532,697, Janu- ary 15, 1895	II 1166	V 25
Perky U. S. Patent No. 532,698, Janu- ary 15, 1895	II 1166	V 29
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Montgomery U. S. Patent No. 533,821, February 5, 1895	II 1166	V 55
Perky U. S. Patent No. 548,086, Octo- ber 15, 1895	II 1166	V 59
Perky U. S. Design Patent No. 24,688, September 17, 1895	II 1166	V 61
Perky U. S. Patent No. 571,284, Novem- ber 10, 1896	II 1166	V 65
Perky U. S. Patent No. 598,745, Febru- ary, 8, 1898	II 1166	V 77

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	Perky U. S. Patent No. 667,892, February 12, 1901	II	1166	V	91
	Perky U. S. Patent No. 678,127, July 9, 1901	II	1166	V	100
	Perky U. S. Patent No. 678,625, July 16, 1901	II	1166	V	121
	Perky U. S. Patent No. 681,656, August 27, 1901	II	1166	V	135
	Burkank U. S. Patent No. 683,100, September 24, 1901	II	1166	V	143
	Burbank U. S. Patent No. 683,101, September 24, 1901	II	1166	V	149
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	Burbank U. S. Patent No. 685,671, October 29, 1901	II	1166	V	165
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	Perky U. S. Patent No. 746,145, December 8, 1903	II	1166	V	173
	Burbank U. S. Patent No. 770,159, September 13, 1904	II	1166	V	181
	Horner U. S. Patent No. 785,554, March 21, 1905	II	1166	V	189
	Perky U. S. Patent No. 797,604, August 22, 1906	II	1166	V	201
	Smith U. S. Patent No. 1,195,114, August 15, 1916	II	1166	V	225
	Anderson U. S. Patent No. 1,334,429, March 23, 1920	II	1166	V	231
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203—	Valentine U. S. Patent No. 831,909, Sep- tember 25, 1906	II 1166	V 319
204—	Book of Patents Issued to Defendant, Viz.: Valentine U. S. Patent No. 1,102,614, July 7, 1914	II 1166	V 331
	Kellogg U. S. Patent No. 1,159,045, November 2, 1915	II 1166	V 355
	Kellogg U. S. Patent No. 1,189,130, June 27, 1916	II 1166	V 357
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	Hanford U. S. Patent No. 1,091,509, March 31, 1914	II 1166	V 373
	Valentine U. S. Patent No. 1,124,363, January 12, 1915	II 1166	V 411
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205—	Book of Miscellaneous Patents Issued to Others Than Plaintiff or Defendant, Viz.: Cooley U. S. Patent No. 782,109, Feb- ruary 7, 1905	II 1167	V 437
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246—	Bid of Plaintiff May 8, 1933, Department of Interior, Washington, D. C.	II	1170	Not printed	
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248—	Bid of Plaintiff March 17, 1933, U. S. Marine Corps, Washington, D. C.	II	1172	Not printed	
249—	Bid of Defendant February 3, 1933, Marine Barracks, Dover, N. J.	II	1172	Not printed	
250—	Advertisement, The Natural Food Co. in New York Daily Tribune, May 12, 1907	II	1176	Not printed	
251—	Advertisement, The Shredded Wheat Co. in Trade, Detroit, April 9, 1913	II	1176	Not printed	
252—	Package of Arrowroot Biscuits	II	1177	Not printed	
253—	Package of Fig Newtons Biscuits	II	1177	Not printed	
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255—	Certificate of Incorporation of The Colorado Shredded Wheat Co.	II	1177	Not printed	
256—	Carton of Kellogg's Corn Flakes	II	1178	Not printed	
257-A—	Clarke Sketch of Cutting of Diamond-Shape Biscuit	II	1178	Not printed	

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262—Box Plaintiff's Premium Flake Crackers ..	III	2035

DEFENDANT'S EXHIBIT UNDER RULE 46.

A—Proceedings in the Patent Office	III	2021	Not printed
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DEFENDANT'S EXHIBIT NO. 242.**Book of Patents Issued to Plaintiff.****(United States Patents.)**

No.		PAGE
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1,195,114,	to C. E. Smith, Dated August 15, 1916	225
1,534,423,	to G. M. Anderson, Dated March 23, 1920	231
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(No Model.)

H. D. PERKY & W. H. FORD.
MACHINE FOR THE PREPARATION OF CEREALS FOR FOOD.
No. 502,378. Patented Aug. 1, 1893.

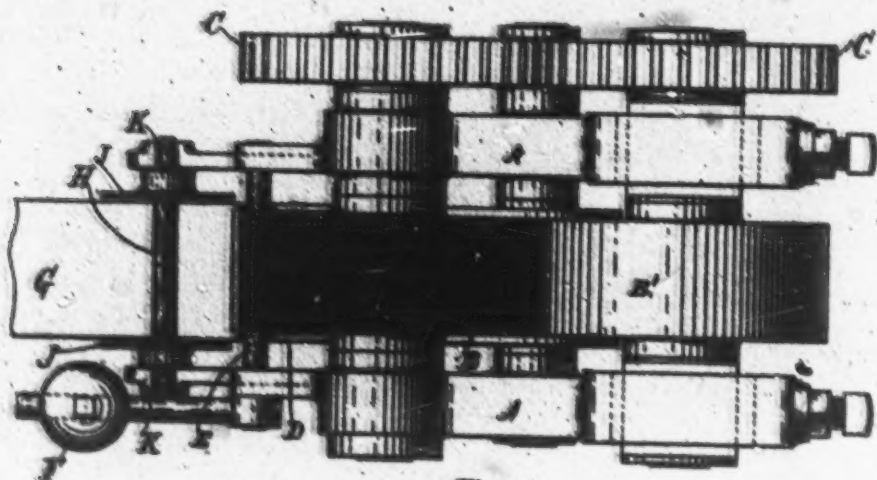


Fig. 1.

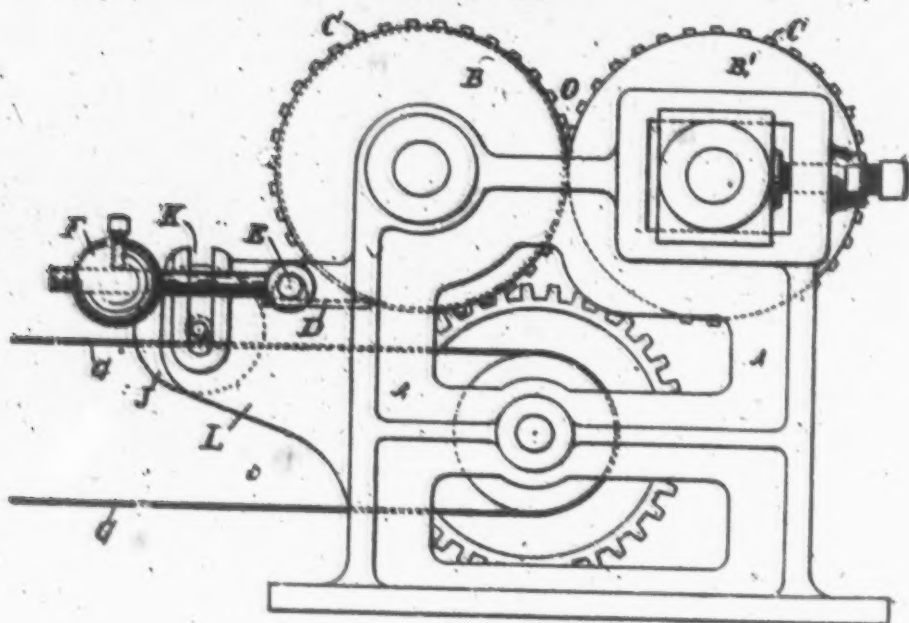


Fig. 2.

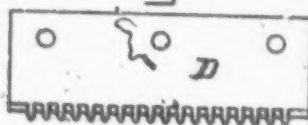


Fig. 3.

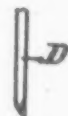


Fig. 4.

WITNESSES:
A. S. Hedges
Belle Stewart

INVENTORS
William H. Ford
Henry D. Perky

UNITED STATES PATENT OFFICE.

HENRY D. PERKY AND WILLIAM H. FORD, OF WATERTOWN, NEW YORK,
ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO THE CEREAL MA-
CHINE COMPANY, OF COLORADO.

MACHINE FOR THE PREPARATION OF CEREALS FOR FOOD.

SPECIFICATION forming part of Letters Patent No. 502,378, dated August 1, 1893.

Application filed October 20, 1892. Serial No. 450,305. (No model.)

To all whom it may concern:

Be it known that we, HENRY D. PERKY and WILLIAM H. FORD, citizens of the United States, residing at Watertown, in the county of Jefferson, State of New York, have invented certain new and useful Improvements in Machines for the Preparation of Cereals for Food, of which machine the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The object of our invention is the economic reduction of cereals in the grain state to desirable forms of food without detracting from their natural nutritious qualities and virtue and for the better preparation of the same for more convenient and general use. These objects are attained by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan view; Fig. 2 an elevation. Figs. 3 and 4 are details of a scraper.

A is a frame supporting the moving parts.

B and B' are two rolls one or both of which are to be grooved circumferentially. Only one marked B is so shown in the drawings. The said rolls are geared together by gears C. C. and may be driven by any convenient power. Roll B is shown with rigid journal bearings while B' is shown with adjustable bearings so that the desired proximity or contact may be maintained between the faces of the two rolls.

D is a scraper having teeth so formed as to fit in the grooves in roll B and between the teeth the said scraper is to fit the cylindrical faces of the divisions separating said grooves. This scraper D is fixed upon a spindle E and is held in contact with roll B by the weight F upon an arm attached to the spindle E. The said scraper may be held in contact with said roll by other convenient means.

G is a conveyer belt.

H is a spindle having loose collars J. J. This spindle plays in vertical slots K. K. of the brackets L. L.

The operation of this machine is as follows: The grain being properly prepared by boiling, steaming, steeping or soaking and the outer shell being removed when desired, is fed in

any convenient manner between the rolls B and B' at O by which it is compressed into the grooves on roll B from which the product in the form of threads, lace or ribbons or sheets, &c., (the form of which depending on the contact or proximity of rolls B and B') is removed by scraper D where it is received by the belt G and carried forward to the spindle H around which the product is wound by the frictional action of the belt against the product; the spindle rising in the slots as the size of the roll increases. If desired the product may be conveyed without winding upon the spindle to any convenient receptacle.

What we claim, and desire to secure by Letters Patent, is—

1. In a machine for the preparation of cereals for food, the combination with a pair of compressing rolls, one of which is provided with circumferential grooves, of a comb-like scraper the teeth of which are arranged to fit said grooves, the spaces between said teeth being arranged to fit the cylindrical faces of the divisions separating said grooves, substantially as specified.

2. In a machine for the preparation of cereals for food, the combination of a pair of circumferentially grooved rolls, the comb-like scraper therefor, the conveyer belt, and the spindle H hung in slotted bearings, over said belt, substantially as specified.

3. In a machine for the preparation of cereals for food, the combination with a pair of compressing rolls, one of which is formed with circumferential grooves, the comb-like scraper therefor, and the weight for holding said scraper in contact with said roll, of the conveyer belt, traveling underneath said grooved roll, and the spindle H journaled in bearing slots over said belt and designed to have frictional contact therewith, substantially as specified.

In testimony whereof we have signed our names to this specification in presence of two subscribing witnesses.

HENRY D. PERKY.
WILLIAM H. FORD.

Witnesses:

D. S. MILLER,
BEILE STEWART.

(No Model.)

2 Sheets—Sheet 1.

H. D. PERKY.
MACHINE FOR THE MANUFACTURE OF FOOD PRODUCTS FROM CEREALS.
No. 520,496.
Patented May 29, 1894.

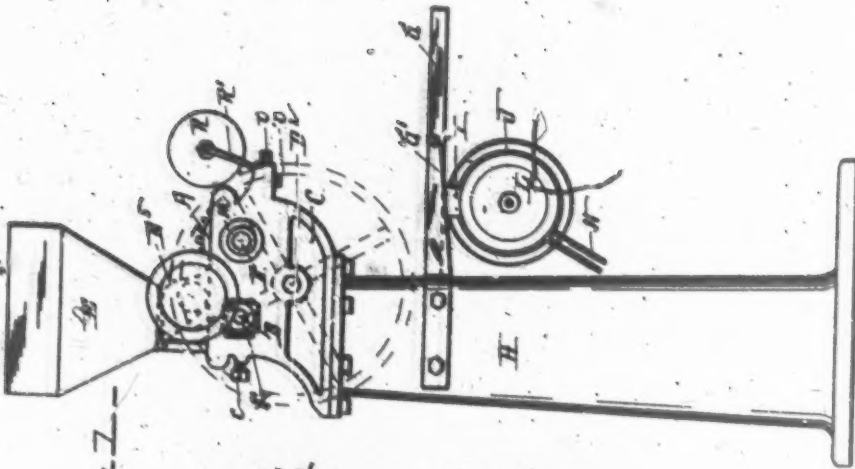
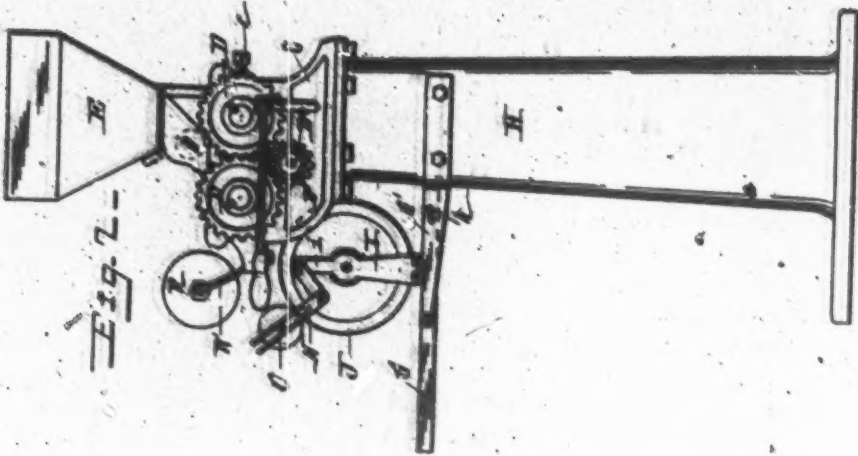


Fig. 2—



Fig. 4—



Fig. 5—

WITNESSES

Geo. M. Tatum
Phil. Massi

INVENTOR

Henry D. Perky
W. W. Anderson,
his Attorney

(No Model.)

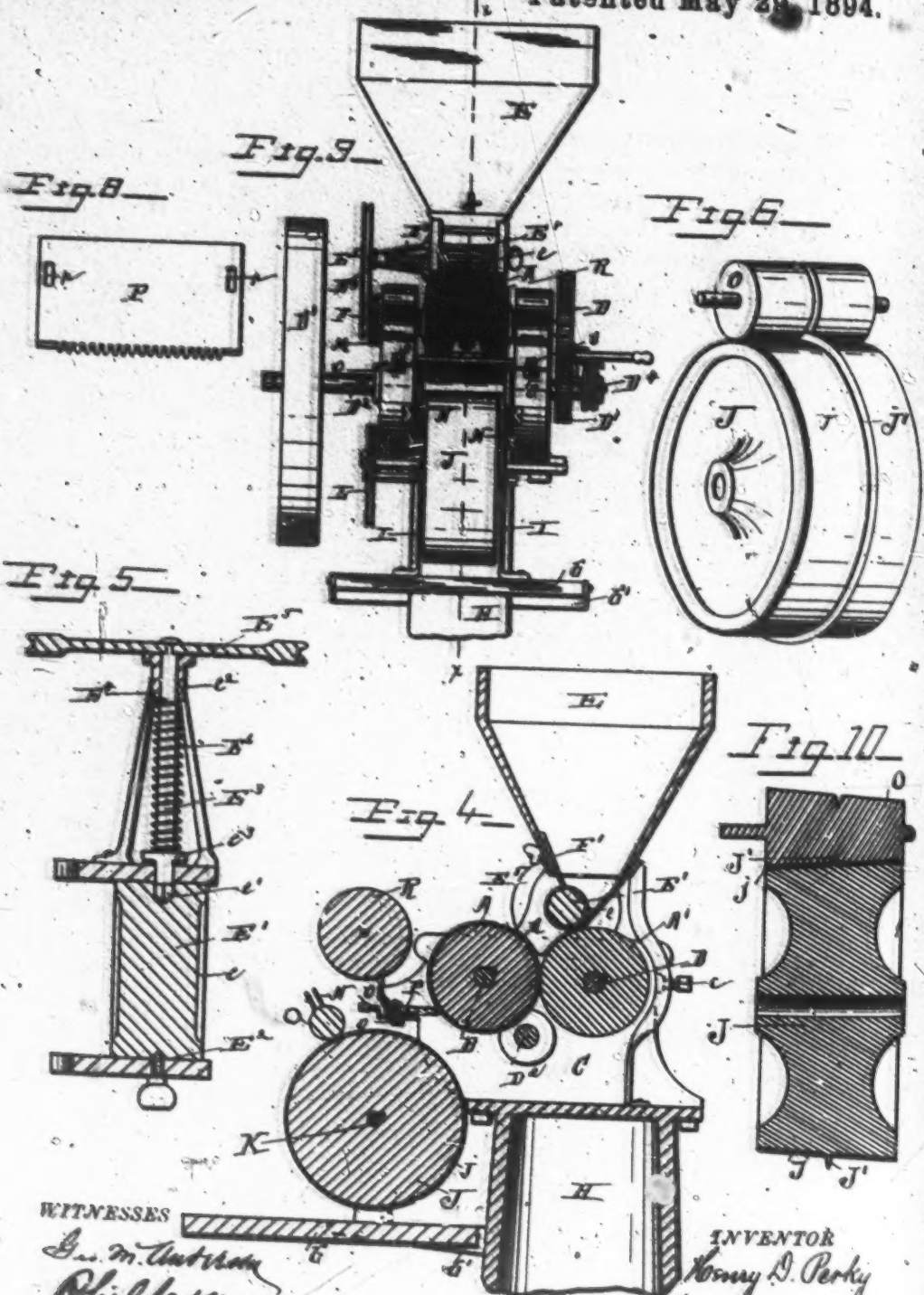
2 Sheets—Sheet 2.

H. D. PERKY.

MACHINE FOR THE MANUFACTURE OF FOOD PRODUCTS FROM CEREALS.

No. 520,498.

Patented May 29, 1894.



WITNESSES

G. M. Anthony
Philleman

INVENTOR

H. D. Perky
E. W. Anderson
his Attorney

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF DENVER, COLORADO, ASSIGNOR TO THE CEREAL MACHINE COMPANY, OF COLORADO.

MACHINE FOR THE MANUFACTURE OF FOOD PRODUCTS FROM CEREALS.

SPECIFICATION forming part of Letters Patent No. 590,493, dated May 29, 1894.

Application filed July 7, 1893. Serial No. 473,940. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Machines for the Manufacture of Food Products from Cereals; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a side elevation of the machine. Fig. 2 is a side elevation of the other side of the machine. Fig. 3 is a front elevation of the machine, with the pedestal broken away. Fig. 4 is a vertical section on the line $x-x$. Fig. 5 is a detail, partly in section, showing the feed roll and its bearings. Figs. 6, 7 and 8 are detail views of modified forms of parts of the invention, and Fig. 9 is a detail view of the comb or scraper. Fig. 10 is a longitudinal vertical section through the rolls O and J .

This invention has relation to certain new and useful improvements in machines for the manufacture of food products from cereals, and it consists in the novel construction and combination of parts, all as hereinafter described and pointed out in the appended claims.

The object of the invention is to provide a practical and efficient machine for the treatment of cereals whereby they may be economically converted into a wholesome food product in desirable and convenient form, as more fully described in my pending application, Serial No. 475,540, filed May 25, 1893.

Referring to the accompanying drawings illustrating the invention, the letters A, A' designate a pair of parallel rolls or cylinders having their shafts B journaled in suitable bearings in a frame C , side by side in close relation to each other, and acting by compression. One or both of said rolls have their surfaces provided with a series of fine circumferential grooves d , separated from each other by plain circumferential spaces b . In the

drawings I have shown only one of the rolls A as having such grooves, the other having a plain cylindrical surface. The shaft of the roll A' is provided with movable bearings b' , 55 acted upon by screws c , for purposes of adjustment to regulate the compression of the rolls one against the other.

D, D are intermeshing gear wheels on the shafts B, B , and driven by a pinion D' on a 60 shaft D^2 , journaled below the shafts B, B , and driven by a pulley D^3 , or by other suitable gear. The shaft D^2 is journaled a little to one side of a central line of the shafts B, B , and meshes with one of the gear wheels D . 65

D^4 is a clutch for throwing the pinion D' into and out of driving engagement with its shaft.

E designates a hopper supported over the rolls A, A' , and E' is a feed cylinder journaled in the throat or discharge of said hopper. This feed cylinder is formed with longitudinal corrugations e , and is made removable from its bearings for purposes of cleaning when necessary. To permit such removal 75 one end of the cylinder has a bearing on a screw point E^2 , while at the other end is a shaft E^3 having a squared portion e' which removably engages a correspondingly shaped socket in the end of the cylinder. Said shaft 80 E^3 has a bearing at e^2 in a bracket E^4 , and carries a grooved pulley E^5 by means of which it, together with the cylinder is rotated. On said shaft is a collar e^3 between which, and the bearing e^2 , around the shaft, is a spring 85 E^6 which normally holds said shaft against endwise movement out of engagement with the cylinder. The shaft may however be withdrawn when it is desired to remove the cylinder, which by this arrangement may be 90 readily accomplished. The pulley E^5 may be driven by a belt from a pulley F on one of the shafts B , as shown, or by friction or other gear connection with such shaft. The corrugations e in the feed cylinder E' assist the 95 feed in that they carry the grain from the hopper and cause it to be deposited centrally between the rolls A, A' .

F' is a slide situated in the throat of the hopper E , and arranged to control the feed. 100

G is a table situated below and in front of the roll A' , and supported by a bracket G' .

carried by the rest or support H of the machine. This table is pivotally swung between the arms of said bracket, being reversible, and is normally held in its horizontal position by means of a thumb screw A, or pin engaging the table through the arm of the bracket. Depending from the under side of said table when the latter is in the position shown in Fig. 1, is a bracket I in which is journaled a roll J, which is usually provided with a covering of canvas, or other suitable material. On the shaft K of said roll is a pulley L, which when the table is in its reversed position, as shown in Fig. 2 is in position to be driven by a belt or other connection with a pulley M on one of the shafts B. Extending from the arms of the bracket I are slotted or forked arms N, N, the slots of which are designed to form bearings for a removable spindle or former roll O.

P designates a comb or scraper supported on the frame in front, and so situated that its teeth are adapted to engage the fine grooves a of the roll A, while the intervening spaces b between the teeth travel upon the plain spaces b between said grooves. The bolts which secure the comb to the frame extend through slots p in the comb frame, thereby permitting the comb to be adjusted toward or away from roll A, by means of adjusting screws o.

The operation of the machine as thus far described is as follows:—The grain being first boiled, steamed, soaked, or steeped, and the outer hull or shell being first removed, when desired, it is fed into the hopper E and is delivered by the rolls A, A', which are geared to rotate toward each other. By the compression of these rolls the grains or cereals are reduced and forced into the grooves a of the roll A, from which the resulting product is removed by the comb P in the form of films, strings, or shreds, of light, tender, and porous character, as more fully described in my application before referred to. In the position of the table as shown in Fig. 1, these films, strings, or shreds, are deposited thereon, or into a suitable receptacle supported thereon for the purpose. When, however, it is desired to turn out the finished product in rolls, cups, or other similar forms, the table is reversed and swung into the position shown in Fig. 2 and the roll J is connected with its driving pulley or gear. The shreds, strings, or films, fall upon this roll from the comb, the rotation of the said roll also causing, by friction, the rotation of the spindle or former roll O, which catches such shreds, strings or films and winds them thereon into a cylindrical mass. In order to facilitate the removal of this mass from the former roll or spindle, the latter is preferably made slightly tapering or conical, the roll J being of similar form.

In some cases it may be desired to divide the mass transversely of its length into two parts, and this may be accomplished by

means of a cutter R carried by an arm R' pivoted to the front portion of the frame, and adapted to be turned down into cutting contact with the mass as it forms on the roll or spindle O. The same effect may be accomplished by forming the roll J with a central, circumferential cutter projection J', as shown in Fig. 6, or by omitting a few of the grooves a at the central portion of the roll A, as in Fig. 7, so that the product is naturally delivered in two parts.

When both rolls A and A' are provided with the grooves each roll is designed to have a comb and delivery and forming devices, the arrangement being a duplication of that shown.

In some instances in addition to the circumferential grooves a, I may provide the rolls with grooves at right angles to the grooves a, or obliquely thereto, as shown in Fig. 8. This aids the feed and adds to the capacity of the rolls.

Having thus described my invention, what I believe to be new, and desire to secure by Letters Patent, is—

1. In a machine for treating cereals, the combination with the hopper and the compression rolls, of the removable rotary feed cylinder in the throat of said hopper, and above said rolls, a screw forming a bearing for one end of said cylinder, the shaft detachably engaging an angular socket in the opposite end portion of the cylinder, the bearing for said shaft, the spring, and means for driving said shaft and thereby said cylinder, substantially as specified.

2. In a machine for treating cereals, the combination with the compression rolls, and the comb or scraper, of the reversible table, the bracket secured thereto, the roll journaled in said bracket, the former roll or spindle also carried by said bracket, and means for rotating said roll, substantially as specified.

3. In a machine for treating cereals, the combination of the compression rolls, the comb or scraper, the reversible table, the bracket carried thereby and having the forked or slotted arms, the receiving roll journaled in said bracket, the former roll or spindle removably journaled in said forked or slotted arms, and designed to be rotated by frictional contact with said receiving roll, and means for rotating said feeding roll, substantially as specified.

4. In a machine for treating cereals, the combination of the compression rolls, the comb, the receiving roll, the former roll or spindle, and means for dividing the product taken by said former roll into two parts, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

JOHN S. PERKY,

THOS. H. HARDCASTLE.

(No Model.)

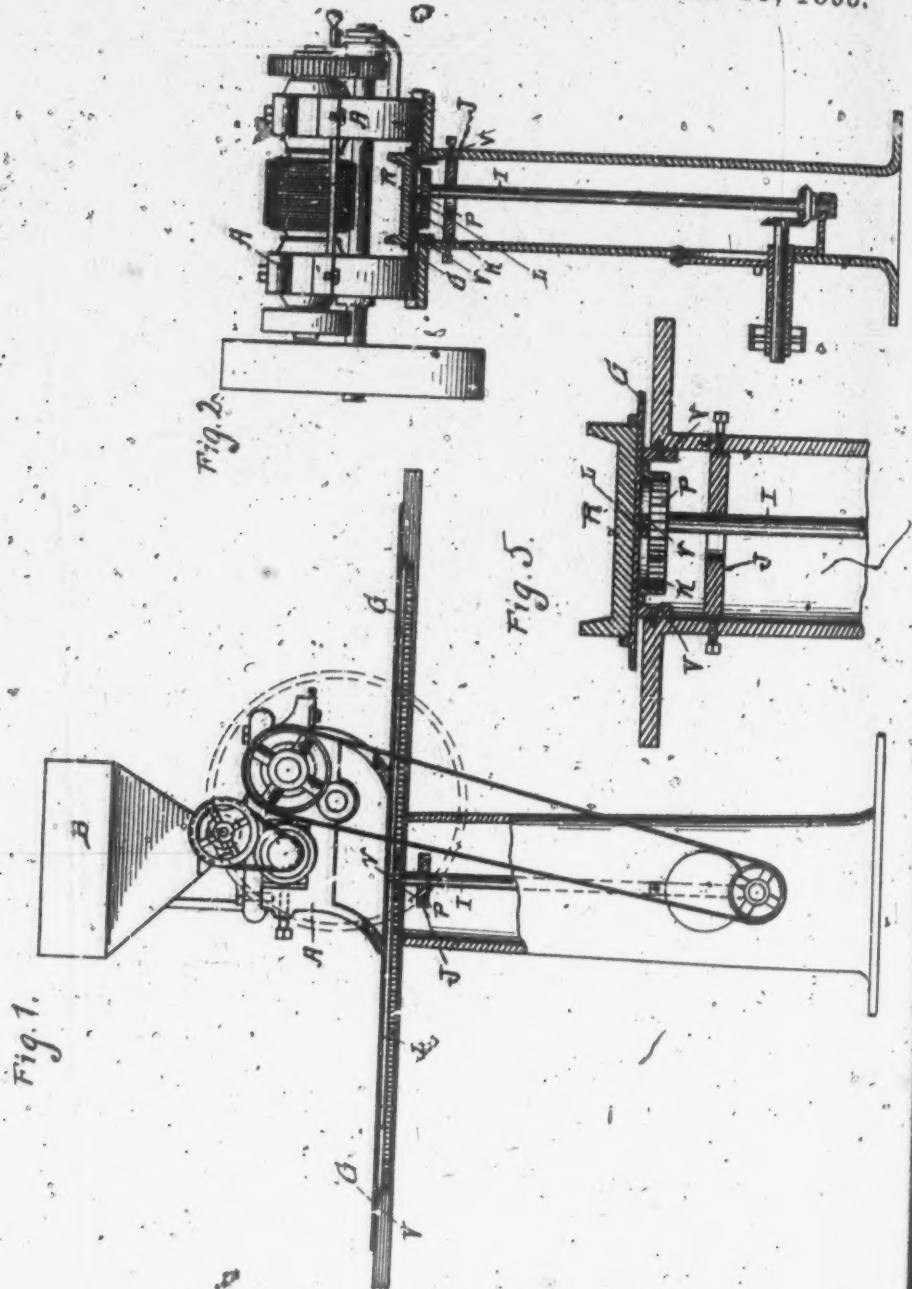
2 Sheets—Sheet 1.

H. D. PERKY.

ROLL MACHINE FOR REDUCING CEREALS FOR FOOD.

No. 532,480.

Patented Jan. 15, 1895.



WITNESSES

Geo. M. Anderson
Phillips

INVENTOR

H. D. Perky

E. W. Anderson

Attorney

(No Model.)

2 Sheets—Sheet 2.

H. D. PERKY.

ROLL MACHINE FOR REDUCING CEREALS FOR FOOD.

No. 682,480.

Patented Jan. 15, 1895.

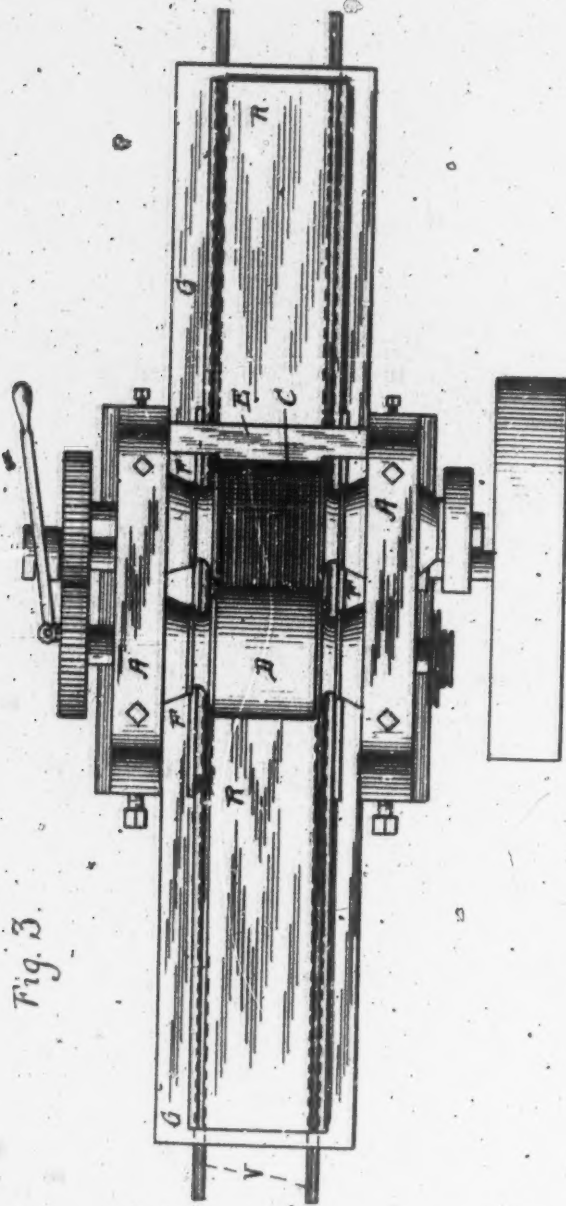


Fig. 3.

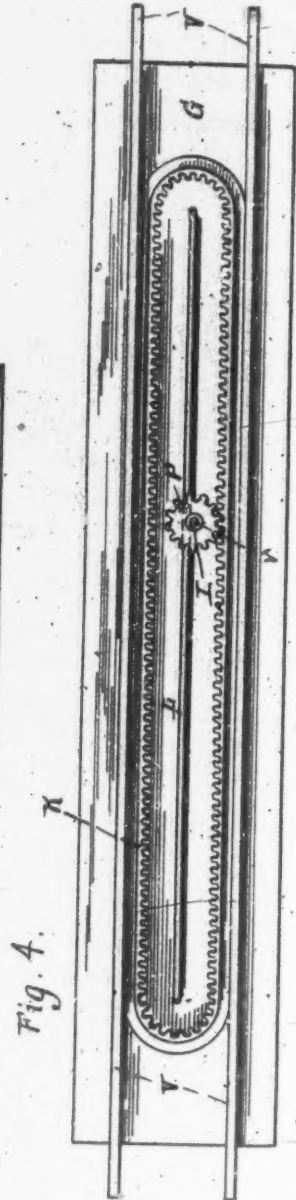


Fig. 4.

WITNESSES

Geo M. Anderson
Phil. Ulasi.

INVENTOR

H. D. Perky

by E. W. Anderson

his Attorney

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF DENVER, COLORADO, ASSIGNOR TO THE CEREAL MACHINE COMPANY, OF SAME PLACE.

ROLL-MACHINE FOR REDUCING CEREALS FOR FOOD.

SPECIFICATION forming part of Letters Patent No. 532,490, dated January 15, 1895.

Application filed March 31, 1894. Serial No. 505,950. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful improvements in Roll-Machines for Reducing Cereals for Food; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a side view, partly in section, of a machine embodying the invention. Fig. 2 is a front elevation, of the machine, with parts in section; the hopper being removed. Fig. 3 is a plan view of the machine with the hopper removed. Fig. 4 is a bottom plan view of the endless rack, its support, and the pinion; and Fig. 5 is a detail, sectional view of part of the frame, showing the engagement of the rack and pinion.

The object of this invention is to provide a reducing machine for grain and other articles of food, whereby the material, being reduced continuously by the machine to the form of long threads or shreds, falls upon a long reciprocating receiver, which disposes said threads or shreds lengthwise of the receiver in layers to any desired thickness.

In the accompanying drawings the letter A designates the frame of a reducing machine, supporting a hopper B, and a pair of reducing rolls C and D, whereof the roll C is formed with circumferential grooves, into which the material fed into the hopper is compressed, and from which it is discharged in thread or shred-like form by means of the comb or scraper E, having its toothed edge complementary in contour to the sectional form of the grooved roll. These shreds or threads, especially those formed by passing cooked wheat grains between the rolls, are very tender and delicate, and cannot be independently manipulated or disposed after discharge by the comb. The form, therefore, in which they are laid or disposed by the machine upon such discharge is of great importance.

Under the rolls and comb of the machine is

provided a through-way or passage F, for a reciprocating receiver, which consists usually of a reciprocating holder or plate G, a detachable receiving board or trough R, and suitable reciprocating mechanism.

In order to provide a compact machine of this character with a long throw of the receiver, various mechanisms may be employed, such as a vibrating lever, or reversing cams, with pulley and reversing cord, or the device indicated in the drawings which is preferred, being compact, reliable, and capable of arrangement within the framing. In this movement, the letter K, represents an endless internal-tooth rack, cast or otherwise attached to the under side of the plate G, such rack being of elongated form, with parallel sides and semicircular ends. Between the sides midway is also attached to the under side of said plate a guide rib L, the ends of which are separated from the semicircular toothed ends of the rack sufficiently to allow for the passage of the pinion P, from one side of the rack to the other. This pinion is secured to the upper end of the vertical shaft I, the lower end of which may be turned by means of bevel gearing, or otherwise. It is provided with a central stud v, engaging the rib L.

Below the pinion the shaft engages the transverse slotted bearing J, whereby sufficient lateral vibratory movement is allowed to the shaft I, when its pinion engages the semicircular ends of the rack in passing from one side thereof to the other. As the pinion rotates in engagement with one side of the rack the plate or holder or carriage G, is moved longitudinally in the passage F, until the semicircular end of said rack comes into engagement with said pinion, causing the latter to transfer its engagement from one side of the rack to the other, and thereby reversing the endwise motion of said plate or carriage.

A detachable or removable receiver, board or trough R, is usually provided, to be placed on the plate G, to receive the shreds or threads as they fall from the reducing rolls. The reciprocating movement disposes these continuous shreds longitudinally on the receiver, and in layers, these layers increasing in number, in accordance with the number of reciprocations of said receiver, until the desired thick-

ness is produced. The receiver board with its contents can then be removed from the plate or carrier, and another substituted. The contents of the trough can be subdivided into biscuits or loaves for baking.

The carrier or plate G moves upon elongated guide arms V, extending from the frame, which is usually constructed in hollow pedestal form inclosing and concealing the reciprocating gear mechanism of the receiver.

The receiver is designed to be geared up to run at about the same speed as the reducing rolls, or a little more slowly when it is desired to effect a wavy or sinuous disposition of the shreds or threads along the receiver.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. In a food-reducing machine, the combination with the rolls and discharging comb, of a reciprocating receiver, adapted to dispose the shreds or threads, as they fall from the reducing rolls, in longitudinal manner and in layers, substantially as specified.

2. In a food-reducing machine, the combination with the frame, the reducing rolls, the discharging comb, and the passage in said frame below said rolls and comb, of the reciprocating plate or carrier, and the removable receiver board or trough substantially as specified.

3. In a food-reducing machine, the combination with reducing mechanism, of a receiver plate its endless bottom rack and guide, the vertical vibratory shaft its pinion, and the driving gear, substantially as specified.

4. In a food-reducing machine, the combination with reducing rolls of a reciprocating receiver moving in a way or passage of the frame, below said reducing rolls, and having its reciprocating mechanism inclosed in said frame, substantially as specified.

In testimony, whereof I affix my signature in the presence of two witnesses.

HENRY D. PERKY.

Witnesses:

J. M. STANLEY,
HARRY C. JAMES.

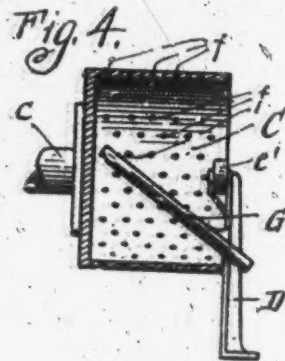
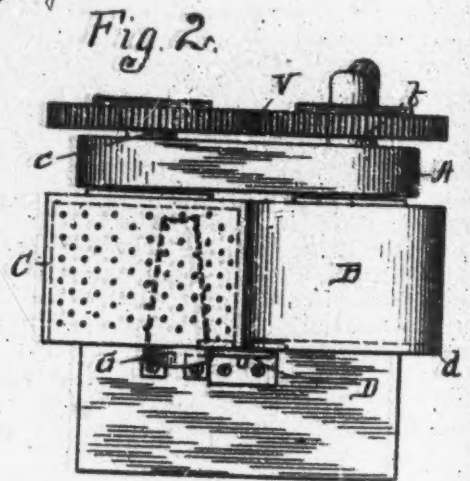
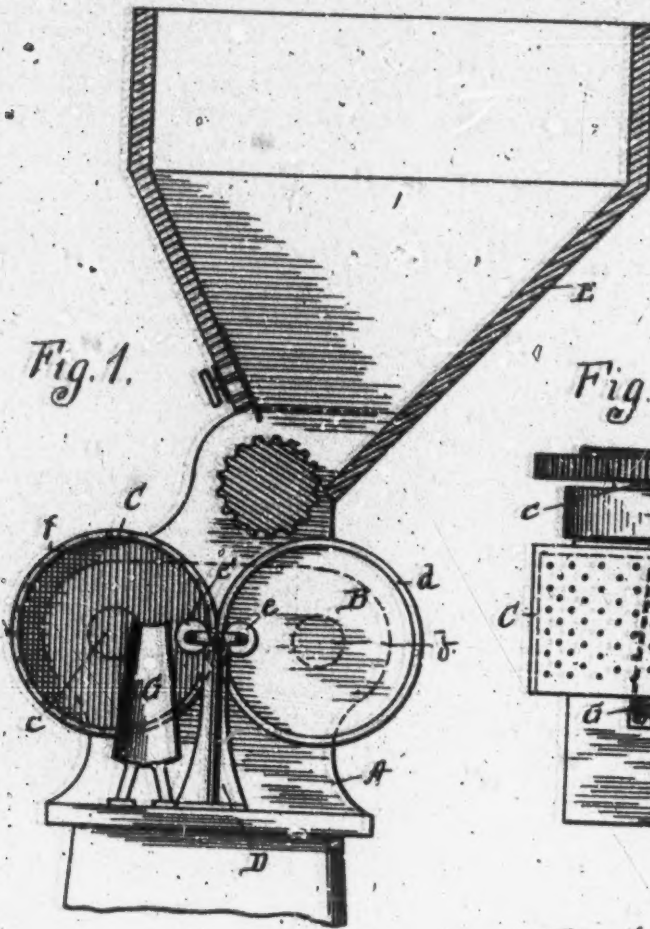
(No Model.)

H. D. PERKY.

PERFORATED ROLL MACHINE FOR REDUCING CEREALS FOR FOOD.

No. 532,481.

Patented Jan. 15, 1895.



WITNESSES

Geo. M. Anderson
Philet Macer.

INVENTOR

Henry D. Perky

By C. W. Anderson

his

Attorney

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF DENVER, COLORADO, ASSIGNOR TO THE CEREAL MACHINE COMPANY, OF SAME PLACE.

PERFORATED-ROLL MACHINE FOR REDUCING CEREALS FOR FOOD.

SPECIFICATION forming part of Letters Patent No. 582,481, dated January 15, 1895.

Application filed March 31, 1894. Serial No. 505,951. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented new and useful Improvements in Perforated-Roll Machines for Reducing Cereals for Food; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

Figure 1 of the drawings is an end view, partly in section, of a machine embodying the invention. Fig. 2 is a plan view of the same with the hopper removed. Figs. 3 and 4, are detail views showing the discharging scoop in slightly modified form.

The invention has relation to rolling machines for reducing grain to thread like or shred like form, while thoroughly incorporating together the interior and exterior particles of the berry.

In the accompanying drawings, the letter A designates the frame or support, having bearings for the journals of the reducing rolls B, and C, which are designed to work in neat contact with each other.

The roll B is formed preferably of steel, and has a cylindrical surface. Its journal shaft b, is strong and is seated in a long bearing in order to brace the roll to its work. The body of this roll is solid, but it may have a circular end flange d, this being an extension of the marginal portion of said roll at its free end to engage a small roller e, of a tie brace D, which is also provided with a second small roller e', to engage the circular end flange f, of the other roll C.

The roll C is of cylindrical form and hollow, and its cylindrical wall is provided with perforations throughout its extent. This hollow roll is open at one end, and at its other end is formed with a strong back portion to which is connected its journal shaft c, which

is of comparatively large diameter, and is seated in a long bracing bearing.

The rolls are turned by means of gearing, as indicated at V.

E represents a hopper seated on the frame and designed to feed the grain, previously prepared by boiling and drying, to the rolls B, and C, which compress the berries, mashing them, and intimately incorporating the particles composing the outer portions of the berries with the starchy interior part thereof. The action of the rolls forces the grain during this process into and through the perforations of the roll C, the material being protruded within the perforated wall in the form of threads or shreds, growing in length at each revolution of the roll until removed from the cylinder by the operation of a suitable scoop or discharging device G.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. In a machine for reducing grain for food, the combination with a hollow roll having a perforated cylindrical wall, of a cylindrical compressing and crushing roll working in metallic contact therewith, a feeding hopper, and rotating mechanism for said rolls, substantially as specified.

2. In a machine for reducing grain, for food, the combination with a hollow perforated roll, of a cylindrical compressing roll working in contact therewith, the operating gear therefor, and a rolling tie-brace, substantially as specified.

3. In a machine for reducing grain for food, the combination with the hollow perforated roll and the compressing roll working in contact therewith, of the operating gear, the feed hopper, and a discharging device, substantially as specified.

In testimony whereof I affix my signature in the presence of two witnesses.

HENRY D. PERKY.

Witnesses:

J. M. STANLEY,

HARRY C. JAMES.

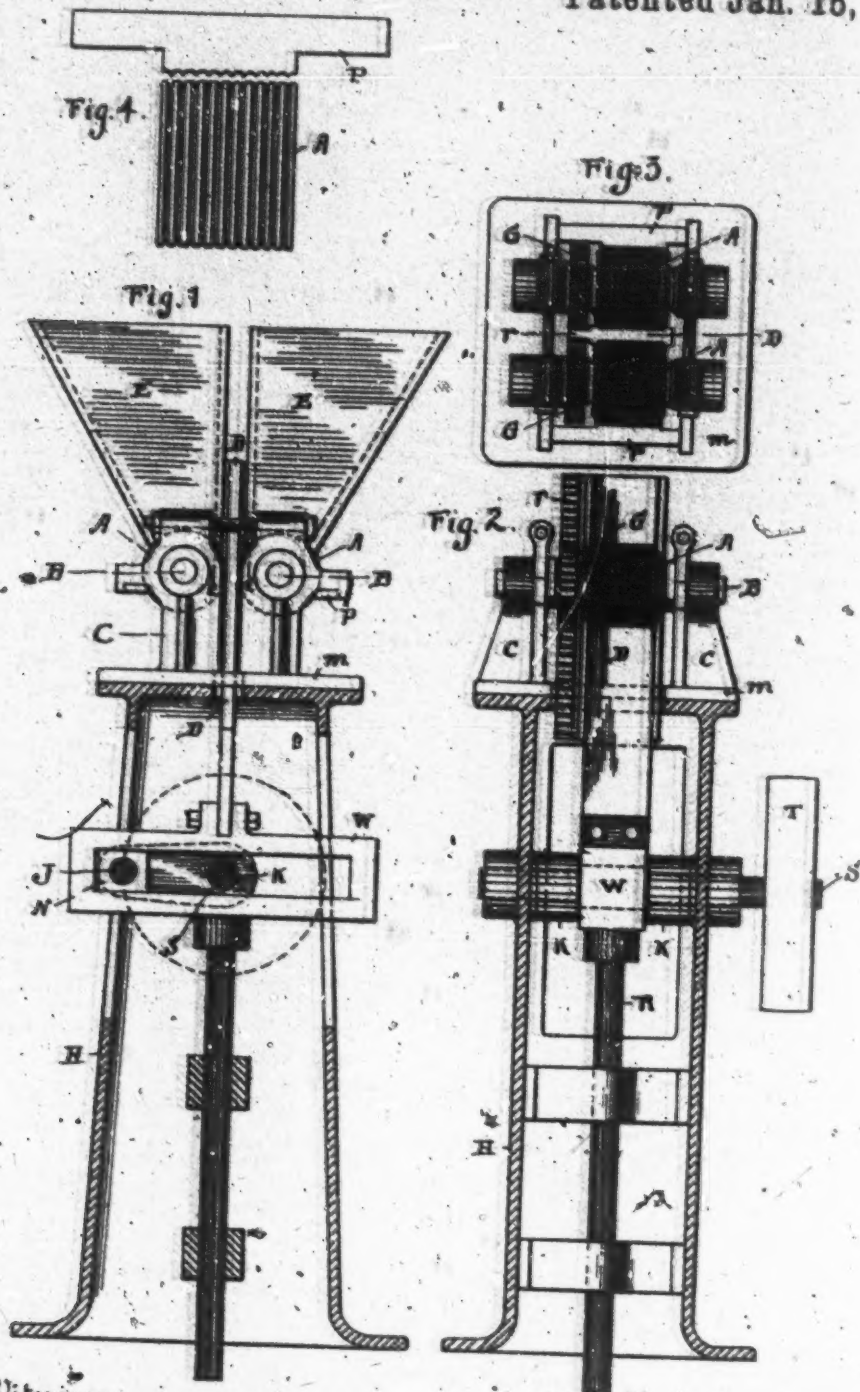
(No Model.)

H. D. PERKY.

ROLL MACHINE FOR REDUCING CEREALS FOR FOOD.

No. 532,897.

Patented Jan. 15, 1895.



Witnesses

Geo M. Anderson
Phillips

By his Attorney

Inventor
Henry D. Perky

E. W. Anderson

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF DENVER, COLORADO, ASSIGNOR TO THE CEREAL MACHINE COMPANY, OF SAME PLACE.

ROLL-MACHINE FOR REDUCING CEREALS FOR FOOD.

SPECIFICATION forming part of Letters Patent No. 532,697, dated January 15, 1895.

Application filed March 31, 1894. Serial No. 505,948. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Roll-Machines for Reducing Cereals for Food; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is an end-view, partly in section, of a machine embodying my invention. Fig. 2 is a front view of the same, also partly in section, with the hoppers removed. Fig. 3 is a plan view of the machine with the hoppers removed; and Fig. 4 is a detail view of one of the groove-rolls and comb.

The object of this invention is to provide a reciprocating or slide machine for the reduction of food, and especially for the reduction of grain to shredded or thread-like form, without detracting from the nutritious qualities and virtues thereof.

The machine consists mainly of the frame or pedestal H, the slide plate D, its gearing, the circumferentially grooved rolls or cylinders A, their gears, the hoppers E, and the discharging combs P. The pedestal or frame is provided at its upper end with standards C; for the grooved rolls, and below, with strong bearings for the crank shaft S, and for the guide rod R of the slotted cross head W.

This machine is usually made in double form, having two grooved rolls between which the slide plate reciprocates each roll being provided with its independent hopper E which rests upon the roll and is provided with an opening or way e, between its rear wall and the cylinder surface for the passage of the contents of the hopper, which is fed down between said roll or cylinder and the slide plate.

The grooved rolls are provided with gears

G, and the slide-plate has a lateral rack connected therewith, which extends upward between and engages the roll-gears G.

The rolls A are provided with fine grooves extending circumferentially around them, said grooves being preferably of V-form; and the combs P, having teeth of similar contour to enter the grooves and discharge therefrom the threads or shreds of the food product.

The slide plate D is connected to the slotted cross-head W, which is given a vertically reciprocating motion by the revolution of the cranks K, crank pin J, and the sliding box N. Motion is given to the cranks and crank pin by the shaft S, and its pulley T, which is belted to any convenient power shaft.

The grain or other material to be shredded, having been suitably prepared by boiling and drying to proper consistence, is placed in the hoppers and fed through the ways e, e, between the faces of the rolls and the reciprocating plate, whose rack r, engaging the gears of the rolls causes them to revolve first in one direction, and then in the opposite direction. On the downward movement of the rack, the material to be shredded is drawn between the inward turning rolls and the plate and forced into the grooves of said rolls from which it is discharged by the combs P, which are attached to the standards C, and extend transversely of the rolls in front engaging the same.

Suitable pans or receivers may be placed upon the flat top m of the pedestal to receive the shredded or filamentous discharge.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with a grooved reducing roll and its discharging comb of the reciprocating plate engaging said roll, and mechanism for operating the same substantially as specified.

2. The combination with a grooved reducing roll, its gear and discharging comb, of the reciprocating plate and rack, and mechanism for operating the same, substantially as specified.

3. The combination with a pair of grooved reducing rolls, their gear, and discharging combs, of the reciprocating plates between said rolls and its rack engaging the gear of said rolls, substantially as specified.

4. The combination with a pair of grooved reducing rolls, their hoppers, gear, and discharging combs, of the reciprocating plate between said rolls, its rack engaging the gear

of said rolls, the slotted cross-head slide-bar and crank shaft, substantially as specified.
In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

J. M. STANLEY,
HARRY C. JAMES.

(No Model.)

H. C. PERKY. GROOVE ROLL MACHINE FOR REDUCING CEREALS FOR FOOD.

No. 532,638.

Patented Jan. 15, 1895.

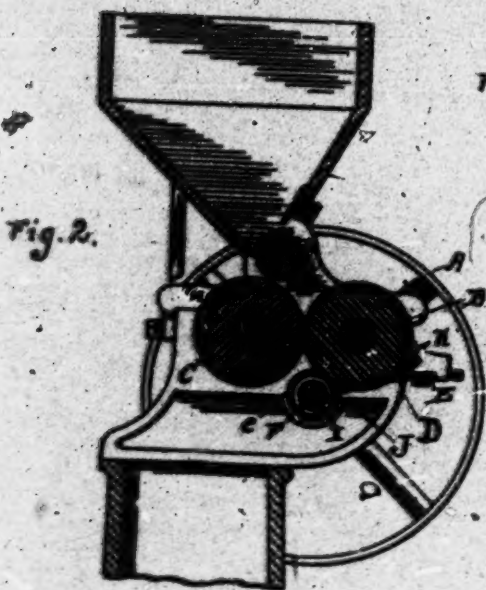
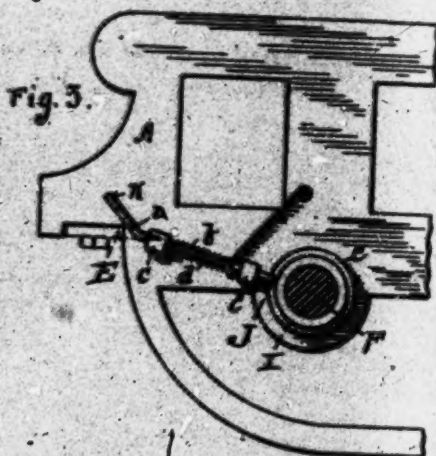
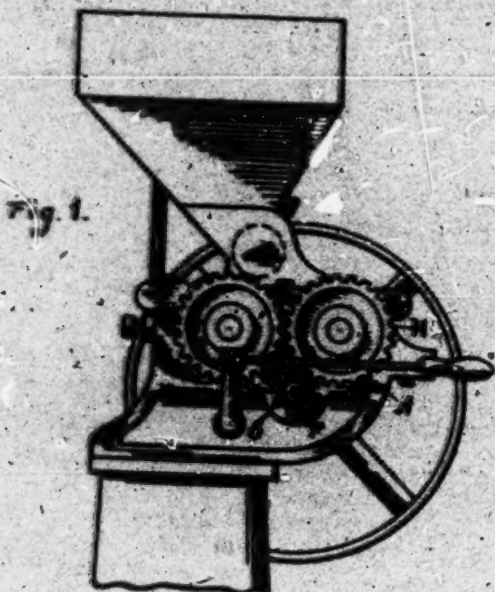


Fig. 4.

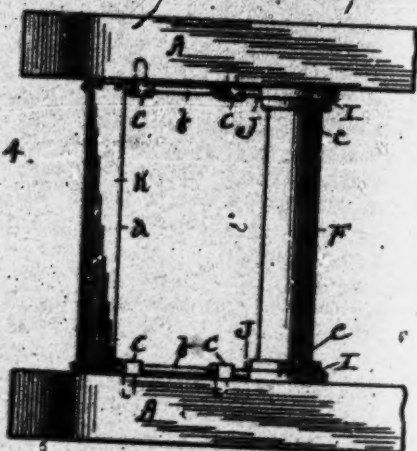
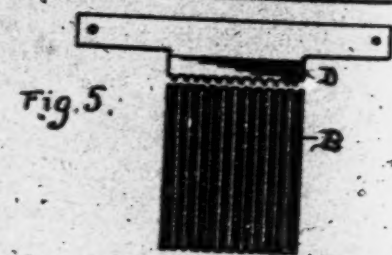


Fig. 5.



WITNESSES

Geo. M. Anderson
Phil. M. Lasi

INVENTOR

Henry D. Perky

W. W. Anderson

his Attorney

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF DENVER, COLORADO, ASSIGNOR TO THE CEREAL MACHINE COMPANY, OF SAME PLACE.

GROOVE-ROLL MACHINE FOR REDUCING CEREALS FOR FOOD.

SPECIFICATION forming part of Letters Patent No. 532,698, dated January 15, 1895.

Application filed March 31, 1894. Serial No. 505,949. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented a certain new and useful improvement in Groove-Roll Machines for Reducing Cereals for Food; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1, of the drawings is an end view of a machine embodying my invention, part of the supporting frame being broken away. Fig. 2 is a vertical section of the same. Fig. 3 is a detail view of a portion of the frame, showing the comb cleaner. Fig. 4 is a plan view of the comb-cleaner and a portion of the frame; and Fig. 5 is a detail view of one of the groove-rolls and comb.

The invention relates to groove roll machines for reducing grain or other articles of food to shredded or thread-like form, and consists mainly in the novel construction, and combination with the grooved roll and its discharging comb, of a cleaner for said comb, as hereinafter set forth. In these machines, although the grooved roll and the discharging comb, are of fine construction, the teeth and lands of the comb fitting neatly the grooves and surface intervals of the roll; it is found that particles of the food material will, to some extent, pass the discharging comb and accumulate on its upper marginal surface near the roll; and the object of this invention is to provide means for clearing away, and avert this accumulation.

In the accompanying drawings, the letter A designates a portion of the frame of the machine, carrying a pair of reducing rolls, whereof the front roll B is formed with a series of fine circumferential grooves, the back roll C having a simple cylindrical surface. The material fed between these rolls is compressed into the fine grooves of the roll B, and is discharged from these grooves in shredded or thread-like form by the comb D, the teeth

of which fit neatly into said grooves. This comb is secured to bearings of the frame, as indicated at E.

F represents a small shaft, located below the reducing rolls, and having a pinion G, engaging the gear-wheel H of the grooved reducing roll. At each end this shaft is provided with a cam I, having a circular contour broken by the notch J.

K indicates the comb cleaner, which is usually a plate of steel extending along the top of the comb, but having an oblique position with reference to the top plane of the comb, its lower or working edge a, when said cleaner is moved inward being just clear of the top of said comb and free of the surface of the grooved roll. This cleaner is designed to have an intermittent quick movement in the direction of this roll, and to give it such motion, the lateral slides b, are employed, these being attached to the ends of the cleaner plate, and working in side bearings c, of the frame in a reciprocating manner, intermittently, their motion being governed by the notch cams I. Springs d, serve to hold the ends of the slides b, in engagement with said cams. At each revolution of the cams I, the cleaner is moved, as the slides enter and leave the notches J, suddenly toward the roll surface, and away therefrom a short distance, this distance being maintained by the engagement of the circular portion e, of the cams with the ends of said slides, until the rotation of the cams brings their notches again to bear on the slides. This intermittent reciprocating cleaner, at each revolution of the cams, quickly pushes whatever particles of material may have accumulated on the inner edge of the comb toward and into the grooves of the reducing roll, so that they are taken up thereby and carried around in said grooves to be mixed with the new material fed from the hopper, and utilized.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with the reducing rolls and the discharging comb, of a comb cleaner, substantially as specified.
2. The combination with the reducing rolls

and the discharging comb, of an intermittently reciprocating comb cleaner, substantially as specified.

3. The combination with the grooved receding rails and the discharging comb engaging one of said rails, of the intermittently reciprocating cleaner plate extending along the top of the comb and having oblique position with reference to its top plane, its lateral

slides and springs, and the circular cams, moving in contact with said slides, substantially as specified.

In testimony whereof I affix my signature in the presence of two witnesses.

HENRY D. PERI

Witnesses:

J. M. STANLEY,
HARRY C. JAMES.

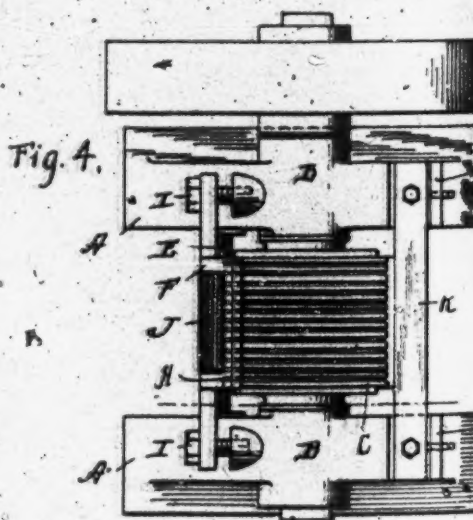
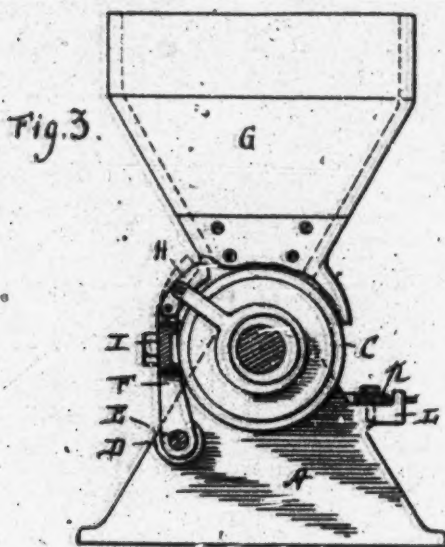
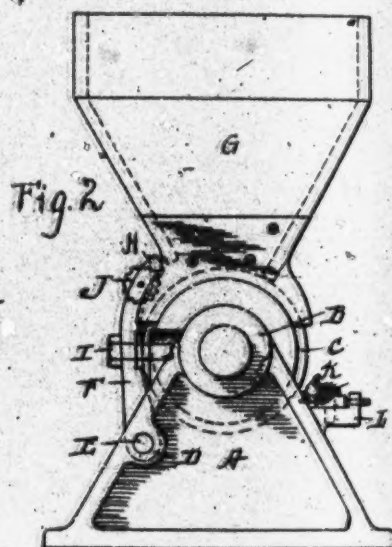
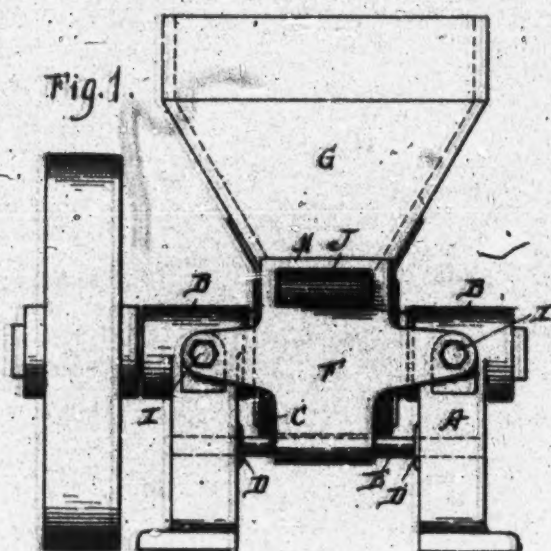
(No Model.)

H. D. PERKY.

ROLL MACHINE FOR REDUCING CEREALS FOR FOOD.

No. 533,551.

Patented Feb. 5, 1895.



WITNESSES:

Gus M. Anderson
Philip C. Mass

INVENTOR

Henry D. Perky

BY

Edw. Anderson

his ATTORNEY

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF DENVER, COLORADO, ASSIGNOR TO THE CEREAL MACHINE COMPANY, OF SAME PLACE.

ROLL-MACHINE FOR REDUCING CEREALS FOR FOOD.

SPECIFICATION forming part of Letters Patent No. 533,551, dated February 5, 1895.

Application filed April 28, 1894. Serial No. 599,404. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Roll-Machines for Reducing Cereals for Food; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a back view of the machine. Fig. 2 is a side view. Fig. 3 is a sectional view. Fig. 4 is a top view with the hopper removed.

This invention has for its object to provide a machine for the reduction of cereals and other articles of food, wherein a single grooved roll is employed in conjunction with a stationary or non-reciprocating adjustable back plate.

In the accompanying drawings, the letter A designates a frame having bearings B, for the reducing roll C, which is designed to rotate upon a horizontal axis, and is circumferentially grooved as indicated. The frame is also provided with bearings D for the pivots E of the back plate F, which is designed to engage the face of the roll C in order to cooperate therewith in reducing the grain which is fed from the hopper G between said roll and the upper extension of flange H, of said plate, and causing the mashed product to enter the grooves of said roll. The back plate is adjustable, its position being governed by the screws I, which extend through lateral bearings of said back plate into the frame. The adjustment required is very slight, whether it be designed to hold the back plate in contact with the surface of the roll in order to reduce the material to shred-like or filamentous form, or to allow a slight interval between the roll surface and the back plate in order to reduce the material to the

form of a ribbon or film having a corrugated surface.

In some cases, it is designed to provide the flange of the back plate with a corrugated feed roll as indicated at J; or the flange may be made to have an oscillating feed motion.

K represents the discharging comb, which is supported upon bearings L of the frame, and extends transversely of the cylinder or roll in front. The contour of its edge is complementary to that of the roll surface which it engages to clear the material from the grooves thereof, discharging the same in thread like or shred form.

In preparing grain for this machine, it should be boiled until sufficiently cooked without destroying the whole form of the grains, and then dried sufficiently to restore somewhat the interior consistence thereof, and equalize the amount of moisture in the several parts of the berry.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. In a reducing machine for grain and other articles of food, the combination with a circumferentially grooved roll, and its discharging comb, of a stationary back-plate engaging said roll, substantially as specified.

2. In a reducing machine for grain and other articles of food, the combination with a circumferentially grooved roll and its discharging comb, of an adjustable-pivoted back plate and the adjusting screws, substantially as specified.

3. A reducing machine for grain and other articles of food having the circumferentially grooved feed roll, the back-plate provided with an upper extension or feed flange, the hopper, and the discharging comb, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

J. M. STANLEY,
HARRY C. JAMES.

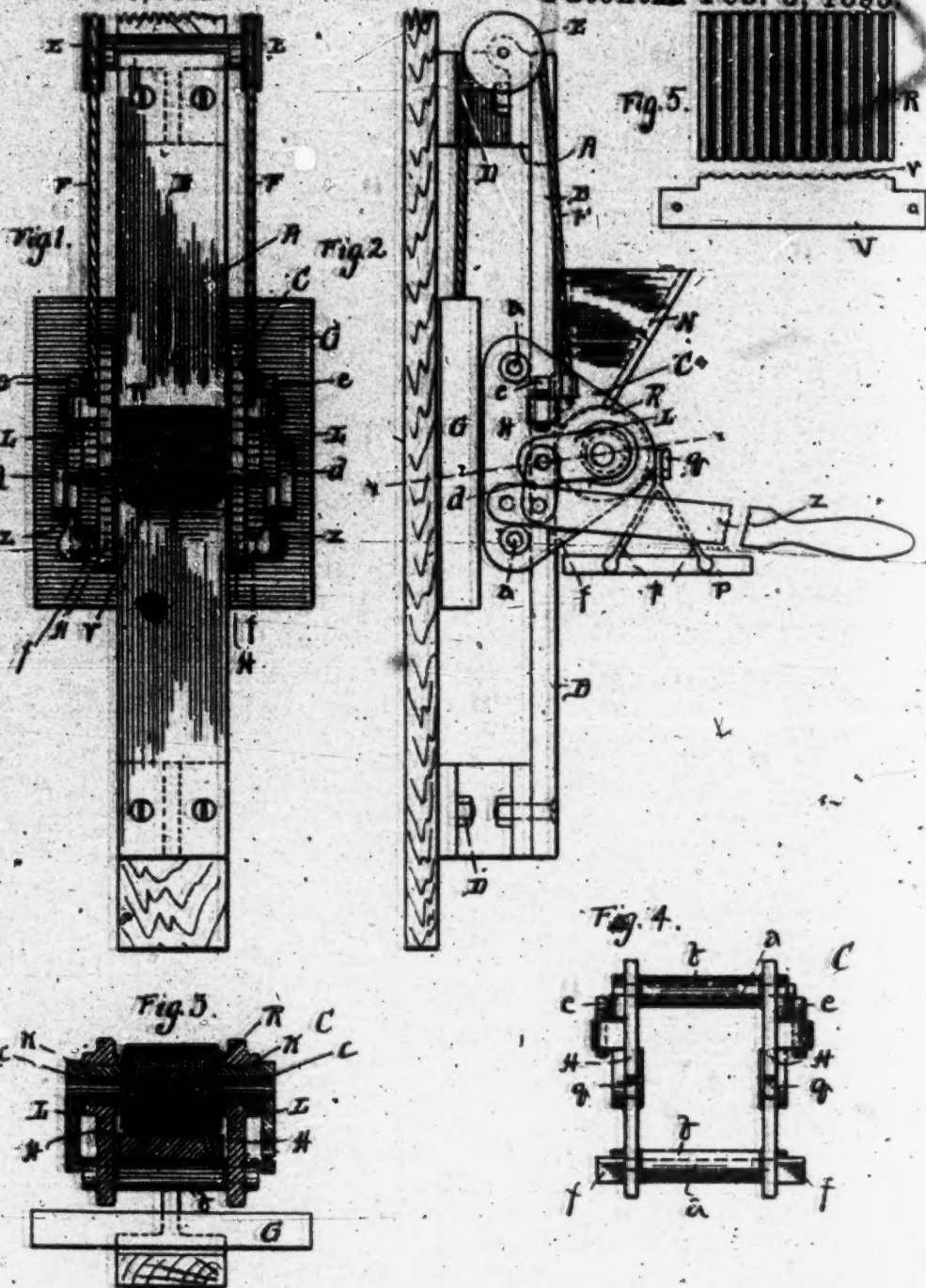
(No Model.)

H. D. PERKY.

ROLL MACHINE FOR REDUCING CEREALS FOR FOOD.

No. 533,552.

Patented Feb. 5, 1895.



Witnesses

Geo. M. Anderson
Philip M. Mason

By his Attorney

Inventor
Henry D. Perky

E. W. Anderson

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF DENVER, COLORADO, ASSIGNOR TO THE CEREAL MACHINE COMPANY, OF SAME PLACE.

ROLL-MACHINE FOR REDUCING CEREALS FOR FOOD.

SPECIFICATION forming part of Letters Patent No. 533,552, dated February 5, 1895.

Application filed April 23, 1894. Serial No. 500,406. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Roll-Machines for Reducing Cereals for Food; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a front elevation of a machine embodying my invention. Fig. 2 is a side view of same. Fig. 3 is a sectional view on the line *a-a* of Fig. 2. Fig. 4 is a detail view of the reciprocating frame, and Fig. 5 is a detail view of one of the groove-rolls and scraper or comb.

The object of this invention is to provide an upright reciprocating or wall machine for the reduction of food, and especially for the reduction of grain to shredded or thread-like form without detracting from the nutritive qualities and virtues thereof.

The machine consists of a frame A of elongated form, having a back plate B, and in connection therewith a reciprocating shredder slide C, having a grooved roll and hopper and devices for operating the same.

The frame A with its elongated back plate is designed to be secured to a wall or upright in vertical position by means of suitable bolts or fastenings indicated at D. At the upper end of the frame are provided the pulleys E each carrying a rope F, one end of which is attached to the slide C, while to its other end is connected the weight G. This weight is sufficiently heavy to balance the slide and to assist the working movement of the latter in the upward direction.

The slide C, is provided with a frame consisting of side plates H, connected by transverse bolts indicated at *a*, which form bearings for the anti-friction rollers *b*, which engage the rear surface of the back plate B. The side plates extend forward at the sides of the back plate, projecting sufficiently to provide bearings for the journals K of the

eccentric levers L, said journals forming bearings for the shaft of the grooved roll or cylinder R, as indicated at *c*. These bearings are eccentrically placed in the lever journals K, so that when said levers are turned downward by depressing the operating levers Z, which are connected thereto by links *d*, the grooved roll or cylinder R is moved away from the back-plate B.

The cylinder R is formed with circumferential grooves preferably of V-form, as indicated in the drawings. Upon it is supported the hopper N, the rear wall of which is made short at its lower end between the side walls to provide a feed way for the contents of the hopper allowing it to pass down along the rear upper surface of the grooved cylinder between the same and the back-plate B.

When the cylinder slide is drawn upward by means of its levers Z, or a treadle connected thereto, the eccentric levers L bring the cylinder R into engagement with the back-plate, so that by its rotation thereon, the grain or other contents of the hopper is reduced to shredded or thread-like form. In the reverse or downward movement of the slide the feeding ceases, and the cylinder is moved away from the back-plate by the action of the eccentric levers. The amount of upward movement of the levers Z, is adjusted and controlled by means of the set screws *e*, on the side plates H, said side plates also carrying stop lugs *f*, which limit the downward movement of the main operating levers Z.

P indicates a removable pan or receiver which is connected to the side plates of the slide by means of its lateral arms *p*, which engage lugs *q*, of said slide or carrier.

V indicates the discharging comb the operating edge *v* of which is shaped to conform to the contour of the cylinder surface across which it extends in front, its small teeth entering the grooves of the cylinder and causing the threads of material brought around in said grooves to fall upon the receiver in shredded or thread-like form.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the circumferentially grooved cylinder and a sliding carrier.

therefor, of the vertical back-plate behind said cylinder, the discharging comb engaging said cylinder, the hopper arranged to discharge between said cylinder and back plate, and devices for operating said carrier and cylinder, substantially as specified.

8. The combination with the vertical back plate, of the reciprocating, adjustable grooved cylinder arranged to move in contact with said back plate, the carrier slide, in which said cylinder is journaled, a discharging comb engaging said cylinder, levers for actuating said slide, and stops for controlling the movements of said levers, substantially as specified.

15 3. The combination with the carrier walls and the grooved cylinder of the eccentric le-

vers bearing in said walls, and the cylinder shaft having eccentric bearings in the journals of said levers, substantially as specified.

4. The combination with the back-plate, and the carrier, of the balance device, the grooved cylinder, the eccentric levers, their eccentric bearings for the cylinder shaft, the operating levers and connections, and the lever stops, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

J. M. STANLEY,
HARRY C. JAMES.

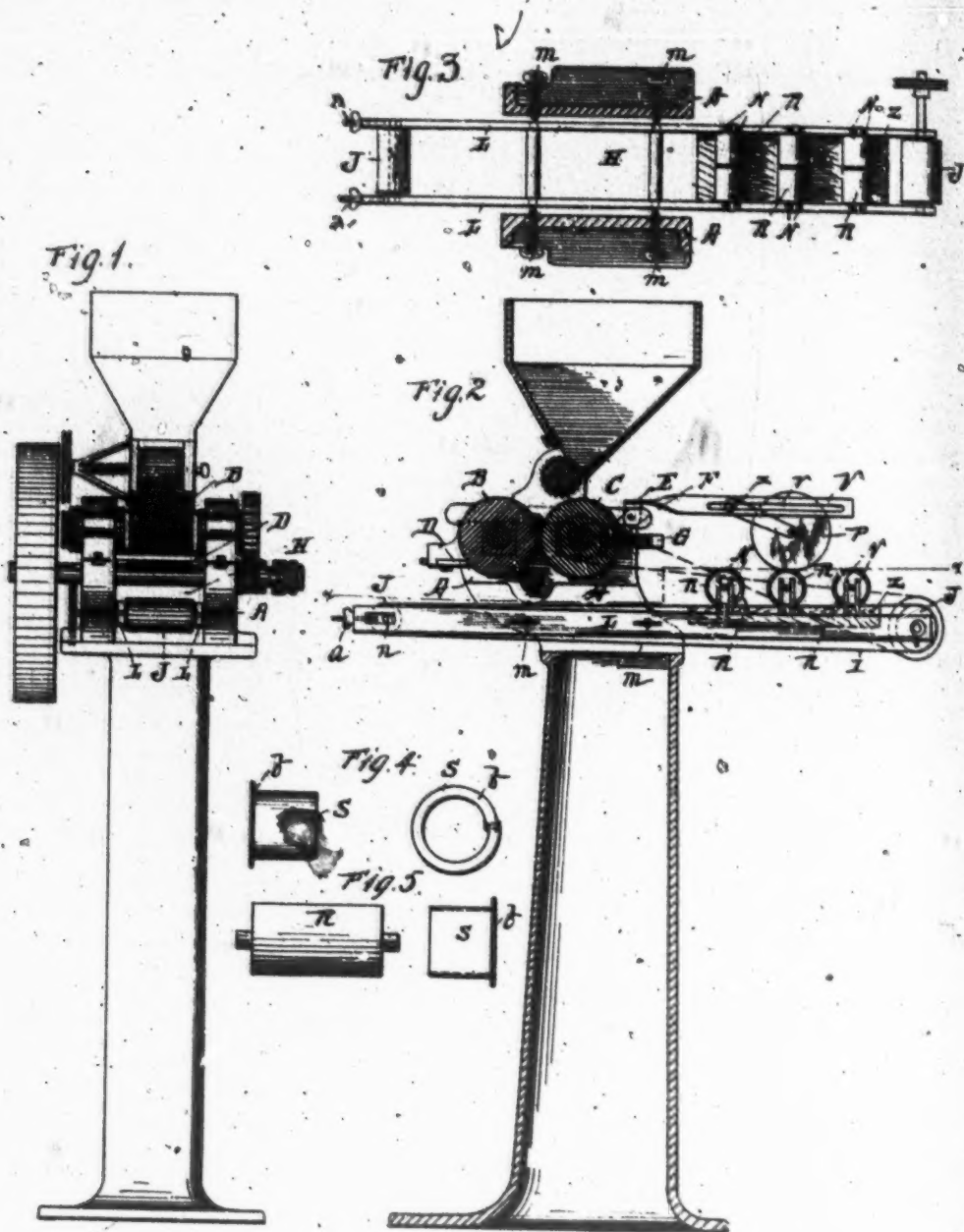
(No Model.)

H. D. PERKY.

ROLL MACHINE FOR REDUCING CEREALS FOR FOOD.

No. 533,558.

Patented Feb. 5, 1895.



Witnesses
 Philip C. Massi
 George H. Parmelee.

Inventor
 Henry D. Perky
 By his Attorney
 E. W. Anderson

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF DENVER, COLORADO, ASSIGNOR TO THE CEREAL MACHINE COMPANY, OF SAME PLACE.

ROLL-MACHINE FOR REDUCING CEREALS FOR FOOD.

SPECIFICATION forming part of Letters Patent No. 533,553, dated February 5, 1895.

Application filed April 28, 1894. Serial No. 509,406. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Roll-Machines for Reducing Cereals for Food; and I do declare the following to be a full, clear and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a front elevation of my invention. Fig. 2 is a partial vertical section thereof. Fig. 3 is a horizontal section on line $x-x$, Fig. 2. Fig. 4 shows details of the shell. Fig. 5 is an elevation of roll with a shell removed therefrom.

The invention is designed to facilitate the formation of the films or threads of material, as discharged from a grain reducing machine, into hollow cylindrical or cup shape.

In the accompanying drawings the letter A designates the frame of a grain reducing machine, having a circumferentially grooved shredding roller B, and a compressing roll C engaging the same, designed to reduce the grain previously softened by boiling and drying to proper consistency, to threadlike or shredded form, the threads or shreds being discharged therefrom by the comb or scraper D having edge teeth conformed to and engaging the grooves of the roll B.

E represents a slide box for one of the rolls, engaging a slide-way F of the frame on each side, whereby said roll is allowed to be separated slightly from its fellow in order to form a ribbon or film of the material, having a ribbed or corrugated surface. The adjustment is controlled by the set screws G.

Below the rolls and above the frame support, is provided in said frame, a passage or through way H, for the reception of a traveling receiver, such receiver being usually removable from the frame.

In the drawings the form of receiver represented is a traveling band or belt I, moving around pulleys J, J, which bear in the ends of

an elongated frame L, which is held in the passage H of the frame by means of the set screws m, which pass through side bearings of the frame. These screws also facilitate the adjustment of the receiver to true position.

At one end of the frame a slide bearing n, is provided for the band pulley said bearing having a tension screw and nut as at a.

The traveler frame carries the vertical slot-bearings N, arranged opposite to each other on the sides of said frame, and being designed to receive the journals of the receiving rollers R.

The threads or films of material discharged from the reducing rolls upon the traveling band are carried thereby in extended form to the nearest receiving roller R, which takes up the same and winds it in circular form, and in layers until the desired thickness of wall is reached. Then this roller with its contents being removed, the material on the band is taken up by the next roller in series and formed thereon to be removed in turn. It will be observed that the feed from the machine on the band to the rollers is continuous, and the formation of the food rings or "cups" expeditious, no time being lost in stopping the machine to remove or replace a roller, a matter of great importance in the production of these articles of food in large numbers and at a low price.

In order to further facilitate the production and preparation of these rings or "cups," each roller is provided with the detachable metallic shells S, which are slipped on said roller from its ends toward its middle portion, the adjacent ends of said shells being separated from each other a little, to provide a way for the cutter P, by means of which the material wound upon the shells is divided, allotting to each shell its proper portion. The shells are usually formed with a divided wall to allow them to be compressed in discharging the rings or cups of food; and this construction also gives them a spring-like hold upon the roller. The shell is also usually provided with a base flange b at one end.

Each shell S is not alone a former or shaper of the food material, but also it constitutes a pan or cooking utensil, as it is designed to be

placed upon its flanged end, in upright position, with its contents, for cooking, in a suitable oven. The perfect form of the rings or "cups" is thereby preserved, and the danger of their injury before cooking reduced to a minimum. When these shells are employed in suitable numbers, two or three winding rollers R, will be found sufficient for the machine.

10 The dividing knife or cutter P, preferably a disk, is carried on an arm V, pivoted or otherwise connected to the frame. The cutter is adjustable in order that it may be readily applied to any roller of the series, for this purpose the arm V is provided with a slot or slide-way v, and a connecting pin or clamp-screw z.

20 Z is a board underneath that portion of the traveling band which is under the rollers R. The purpose of this board is to support the traveling band where it passes under the receiving rollers and hold it in contact with said rollers.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. In a food-reducing machine, the combination with the reducing rolls and discharging comb; of the adjustable and removable

receiver frame, its traveling band, pulleys and tension device, substantially as specified.

2. In a food-reducing machine, the combination with the reducing rolls and discharging comb; of the receiver frame, its pulleys and traveling band, the vertical slot-bearings of said receiver frame, the removable receiver rollers, and a dividing cutter, arranged to be brought into successive engagement with said receiving rollers, substantially as specified.

3. In a food reducing machine, the combination with the reducing rolls, and discharging comb; of the receiver frame, its pulleys and traveling band, the vertical slot-bearings of said receiver frame, the removable receiver rollers, and metallic receiver shells adapted to engage said rollers and removable therefrom, substantially as specified.

4. A divided removable metallic receiver shell provided with a base-flange and adapted to fit on the receiver roller of a traveling receiver, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

J. M. STANLEY,
HARRY C. JAMES.



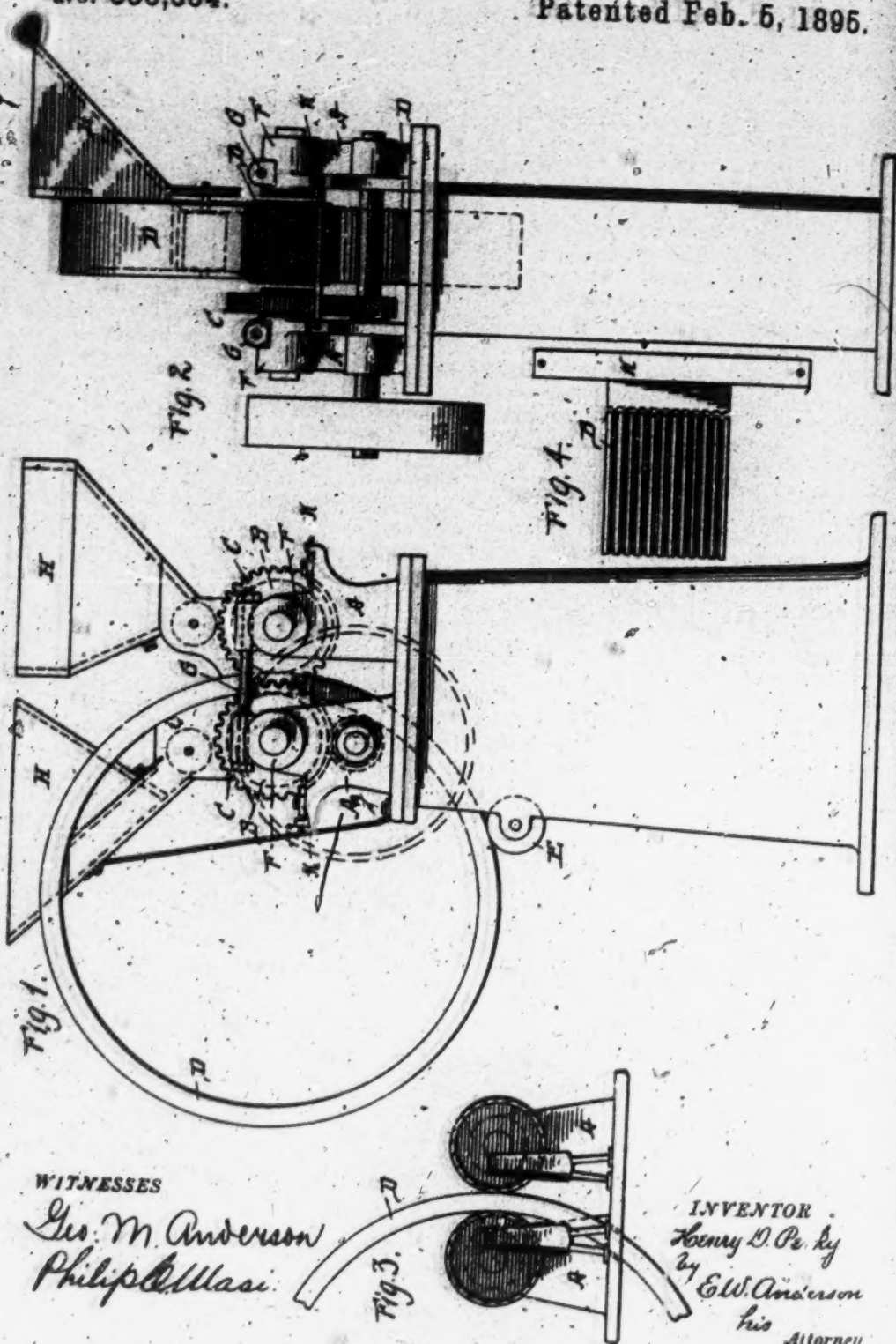
(No Model.)

H. D. PERKY.

ROLL MACHINE FOR PREPARATION OF CEREALS FOR FOOD.

No. 533,564.

Patented Feb. 5, 1895.



WITNESSES

Geo. M. Anderson
Philip A. Massi

INVENTOR

Henry D. Perky
by E. W. Anderson
his Attorney

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF DENVER, COLORADO, ASSIGNOR TO THE CEREAL MACHINE COMPANY, OF SAME PLACE.

ROLL-MACHINE FOR PREPARATION OF CEREALS FOR FOOD.

SPECIFICATION forming part of Letters Patent No. 533,554, dated February 5, 1895.

Application filed April 23, 1894. Serial No. 509,407. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented new and useful improvements in Roll-Machines for the Preparation of Cereals for Food; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings and to the letters of reference marked thereon.

Figure 1 of the drawings represents a side view of the machine. Fig. 2 is a front view. Fig. 3 is a detail showing perforated rolls. Fig. 4 is a detached view of one of the grooved rolls and its discharging comb.

The object of this invention is to provide a machine for the economic reduction of cereals in the grain form to a desirable article of food, without detracting from their natural nutritious qualities, and for the better preparation of the same for general use.

In the accompanying drawings, the letter A designates the frame of the machine.

B, B represent two reducing rolls having engaging gear wheels C, C, and operating mechanism therefor. Between the cylindrical surfaces of the reducing rolls extends a compressing ring or annular traveling band plate D, of comparatively large diameter, said ring having a roller bearing at E.

F, F represent the bearings for the reducing rolls, which may be braced in position by means of tie-bolts G, whereby also, the rolls may be adjusted to proper contact with the traveling ring plate.

H, H indicate the hoppers in which the grain, suitably prepared by boiling and drying to proper condition for the action of the rolls, is placed, and whereby the grains in whole form are fed between the reducing rolls and the intermediate ring plate. As the rolls are rotated, the ring plate revolves and compresses and mashes the grain into the fine circumferential grooves of the rolls, which carry the material until discharged in the

shape of continuous fine threads or shreds by scrapers K. In this action the outer bran layers, the gluten layer and the interior starchy portions of the grain are intimately commingled, and an article of food is presented having all the nutritive qualities and virtues of the various parts of the grain berry, in convenient form for immediate consumption, or for shaping and preparation in various ways for baking.

The circumferential grooves of the reducing rolls are fine, or small in cross-section, and preferably of V-form, and the discharging combs or scrapers have fine teeth of similar contour adapted to enter said grooves, and discharge the threads or shreds of food as they are brought around by the rotation of the rolls. The grooved rolls are especially adapted for the reduction of small grain such as wheat and barley.

In reducing Indian corn, I design sometimes to employ in place of the grooved rolls, hollow rolls having their cylindrical walls provided with a number of perforations, through which, by the action of the traveling ring plate the material is forced in the shape of small threads, which can be discharged from the hollow rolls by means of inclined scoops or other suitable device.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a reducing machine, the combination with the reducing rolls and their hoppers of the intermediate traveling ring plate, and its bearing roller, substantially as specified.

2. In a reducing machine, the combination with circumferentially grooved reducing rolls, their hoppers, and discharging combs or scrapers, of the traveling ring-plate extending between the reducing rolls, substantially as specified.

In testimony whereof I affix my signature in the presence of two witnesses.

HENRY D. PERKY.

Witnesses:

J. M. STANLEY,
HARRY C. JAMES.

(No Model.)

2 Sheets—Sheet 1.

H. D. PERKY.

MACHINE FOR REDUCTION AND PREPARATION OF CEREALS FOR FOOD.

No. 533,555.

Patented Feb. 5, 1895.

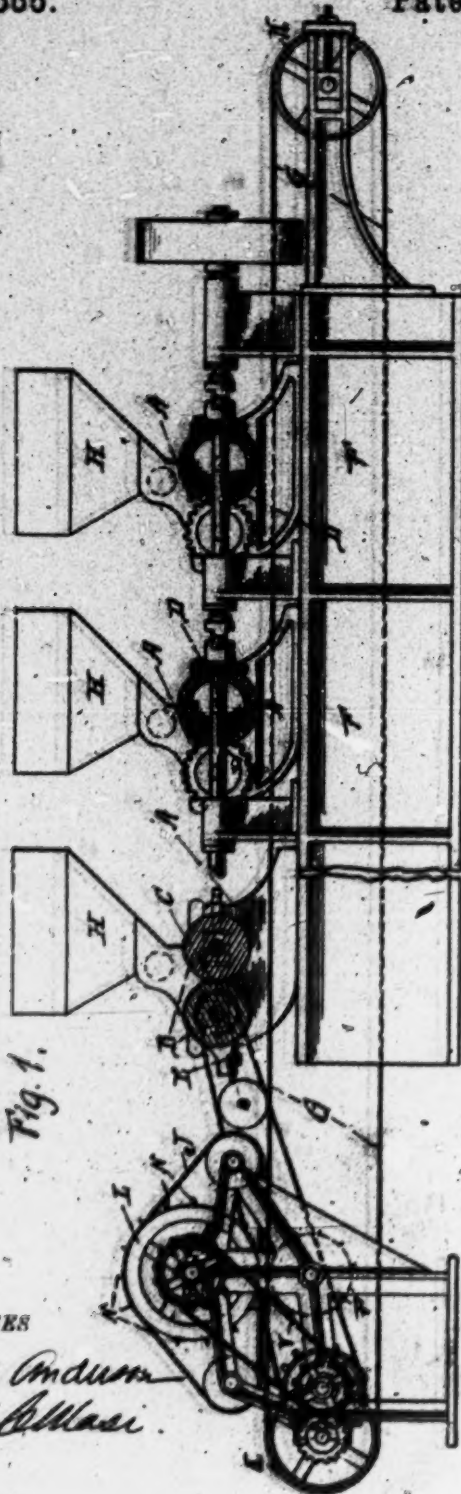


Fig. 1.

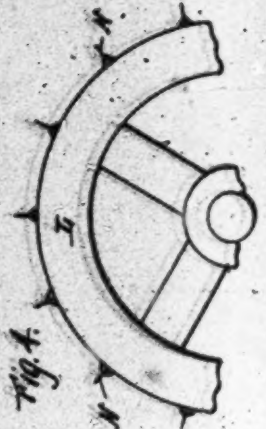


Fig. 4.

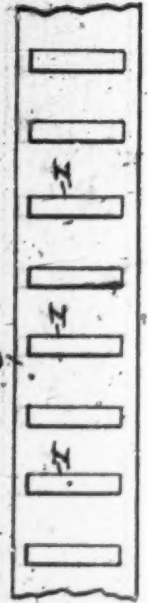


Fig. 3.

WITNESSES

Geo. M. Anderson
Philip A. Massi

INVENTOR

H. D. Perky
Geo. M. Anderson
Attorney

(No Model.)

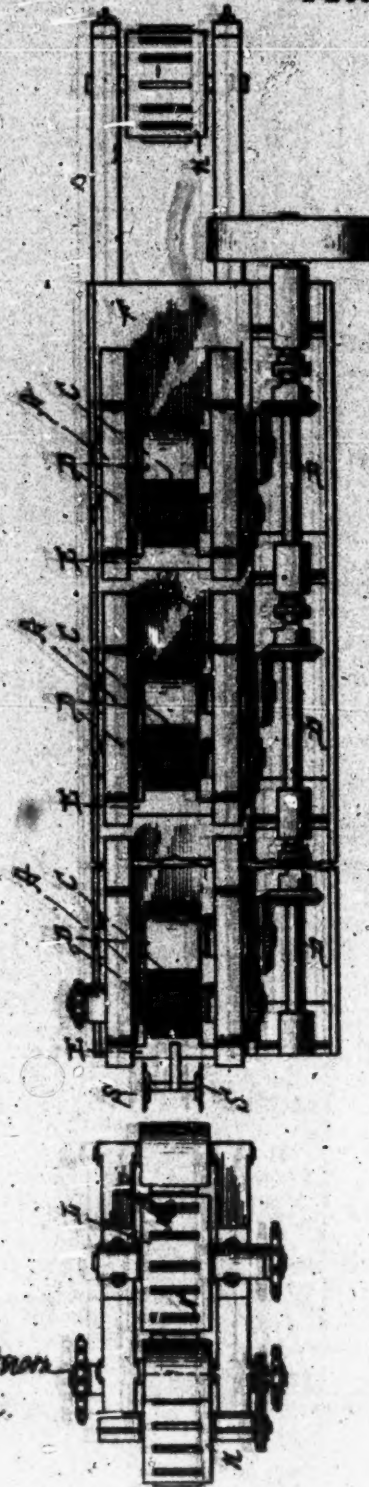
3 Sheets—Sheet 2.

H. D. PERKY.

MACHINE FOR REDUCTION AND PREPARATION OF CEREALS FOR FOOD.

No. 533,555.

Patented Feb. 5, 1895.



WITNESSES

Geo. M. Anderson
Phil. M. Mason

INVENTOR

H. D. Perky
E. W. Anderson
his Attorney

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF DENVER, COLORADO, ASSIGNOR TO THE CEREAL MACHINE COMPANY, OF SAME PLACE.

MACHINE FOR REDUCTION AND PREPARATION OF CEREALS FOR FOOD.

SPECIFICATION forming part of Letters Patent No. 533,555, dated February 5, 1895.

Application filed May 4, 1894. Serial No. 510,075. (No model.)

Be it known that I, HENRY D. PERKY, a

citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented new and useful improvements in Machines for the Reduction and Preparation of Cereals for Food; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which I claim priority to make and use the same, reference being had to the accompanying drawings, forming a part of this specification; and to the letters of reference marked thereon.

Figure 1 of the drawings is a side elevation of the machine with part of the line shaft and part broken away and one of the shredders in section. Fig. 2 is a plan view of the machine. Fig. 3 shows a fragment of slotted belt J. Fig. 4 shows a fragment of the continuous cutter. Fig. 5 is a plan view of grooved roll and comb. Fig. 6 shows a fragment of the slotted belt G.

The invention relates to the economic reduction of cereals in the grain state, to a desirable form of food, and it has for its object to provide means for the production of such form of food, rapidly, and in large quantities, commensurate with the ordinary use of such an article as bread.

In carrying out this invention, I provide in bearings upon a suitable frame F, a series of reducers or shredders A, which are arranged in succession.

Each reducer or shredding device, consists preferably of a pair of rolls B, B, whereof one is grooved. The grooves of the roll extend circumferentially around it, and are of small or fine character, and usually V-shaped in sectional form, the bottom of the groove having however some breadth. A groove having a width of one fiftieth of an inch, and a depth of one fiftieth of an inch, serves an excellent purpose, especially in the reduction of wheat. The grooves are arranged in series around the cylindrical surface of the roll, and the intervals of the cylindrical surface between the grooves may be about one thirtieth of an inch.

The back roll of the pair or set is smooth and its cylindrical surface is in exact and

neat contact with that of the grooved roll. The rolls are geared together to run in contact as indicated at C, and all the sets of the series are rotated at a uniform rate of speed. 55 For this purpose a line shaft D may be provided with suitable gearing engaging the roll gear. Each set of reducing rolls is provided with a discharging scraper or comb E, which is secured to the frame. This scraper or comb 60 has teeth which are complementary in their contour to the grooves of the roll, and engage said grooves to discharge the contents thereof, as brought around in said grooves. Over each set of rolls is a hopper H, into which the 65 grain, having been boiled and sufficiently dried for the proper action of the reducing rolls, is placed.

When the machine is in operation, each set of rolls discharges the grain in the form of 70 continuous threads or shreds of fine or small cross-section. In order to take up these different discharges of the reducers, a continuous receiver belt or carrier G is provided having suitable pulleys or rollers K, at its 75 ends, and proper guides of the framing to keep its upper or receiving portion level. This belt, being run at a suitable rate of speed takes the discharged threads or shreds of the reducers along with it, disposing the 80 layers successively upon each other to a thickness suitable for baking, this thickness being governed by the number of reducers employed. In order to form and subdivide the material thus built up on the belt and carried 85 along thereby into sections for biscuit or loaves, a continuous cutter L is provided. This cutter is preferably one which moves at the same rate of speed as the belt, and may be a wheel having radially projecting blades 90 N, which extend transversely. The distance between the blades determines the breadth of the biscuit-sections. A continuous band J, extends at the height of the proposed biscuit above the carrier belt, and parallel there- 95 with. This band J is run at the same rate of speed as the belt G, and is provided with transverse slots I, which are engaged by the blades of the cutter as the latter revolves, said blades projecting through said slots into 100 the material on the belt G, and subdividing the same into sections. This band J serves

as a clearer for the cutter blades, keeping them free from adherence of the shredded or threaded product.

The cutter should be run by means of a sprocket chain from the belt pulley of the carrier or from some shaft in gear therewith, at the same rate of speed as the carrier belt. By means of this cutter the biscuits or loaves can be nearly cut through or separated so as to leave a thin or web-like attachment between them at their lower portions, such attachment causing them to hold together sufficiently for leading in delivering them to an oven-belt on which they may be baked.

If it is desired to separate the biscuits or loaves entirely the pressure wheel P, which runs under the belt G immediately below the cutter wheel may be provided in order to form an under cutter with short blades V, adapted to protrude in turn through transverse slots Z, which may be formed in the belt G for this purpose.

The threads or shreds of material are very delicate and tender, and, owing to their nature and their roughened or somewhat jagged exterior, adhere to each other readily so as to give considerable stability to the biscuit formation, but in order to prevent them from adhering to the cutter blades or cutter, the clearing belt or band J is provided as hereinbefore described.

S, S designate a pair of cutter disks situated back of the last comb E. The purpose of these disks is to trim the lateral edges of the layers of product on the belt G before it passes to the cutter L.

Any suitable form of gearing may be employed for giving the cutter L and clearer J the proper movements, a suitable arrangement for the purpose being indicated at the right of Figs. 1 and 2.

Having described this invention, what I claim, and desire to secure by Letters Patent is—

1. The combination of a series of sets of reducing rolls, their discharging combs, a continuous receiver belt underneath said rolls, a rotary cutter journaled over said belt beyond the last set of said rolls, and gear for rotating said cutter at the same rate of speed as said belt, substantially as specified.

2. The combination of a series of sets of reducing rolls, their discharging combs, a continuous receiver belt underneath said rolls, a rotary cutter journaled over said belt beyond the last set of said rolls, a slotted endless clearer belt for said cutter, and gear for rotating said cutter and clearer belt at the same rate of speed as the receiving belt, substantially as specified.

3. The combination with the reducing rolls, and a continuous receiver belt, of a moving cutter, and an endless, traveling, slotted clearer belt operating in connection with said cutter, substantially as specified.

4. The combination with reducing rolls and a continuous receiver band, of an endless moving cutter having a series of blades and a slotted endless clearer belt, substantially as specified.

5. The combination with reducing rolls, and a slotted continuous receiver band, of an endless moving cutter, a slotted clearer belt, and a moving under cutter, having its blades working through the slots of the receiver band, substantially as specified.

In testimony whereof I affix my signature in the presence of two witnesses.

HENRY D. PERKY.

Witnesses:

JOHN S. PERKY,
J. M. STANLEY.

6

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(No Model.)

J. H. MONTGOMERY.

PULSATING WATER SEPARATOR FOR REMOVING ROCK, GRIT, OR
FOREIGN MATTER FROM GRAIN.

No. 533,821.

Patented Feb. 5, 1895.

Fig. 1.

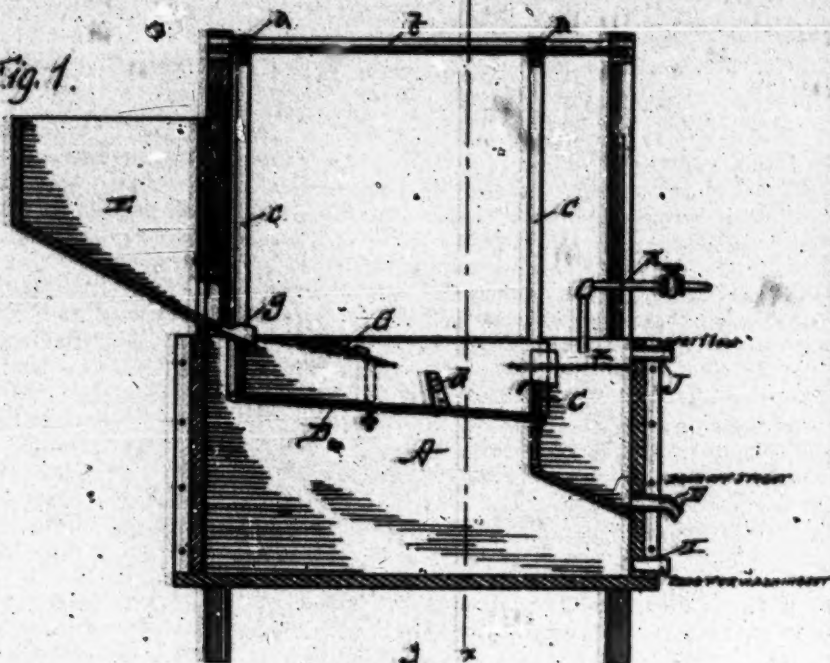
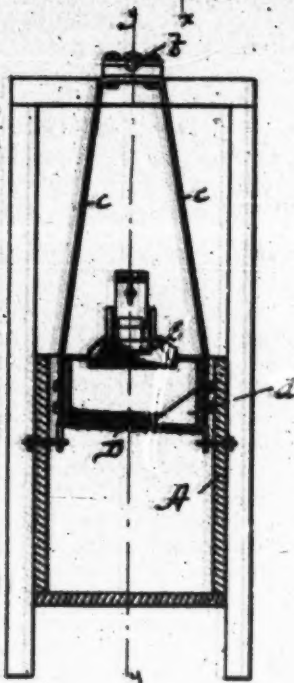


Fig. 2.



WITNESSES

G. A. Anderson—
Philip C. Mason.

INVENTOR

Jas. H. Montgomery,

by G. W. Anderson,
his Attorney

UNITED STATES PATENT OFFICE.

JAMES H. MONTGOMERY, OF DENVER, COLORADO.

PULSATING WATER-SEPARATOR FOR REMOVING ROCK, GRIT, OR FOREIGN MATTER FROM GRAIN.

SPECIFICATION forming part of Letters Patent No. 583,881, dated February 5, 1895.

Application filed May 4, 1894. Serial No. 510,088. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. MONTGOMERY, of the county of Arapahoe and State of Colorado, have invented a certain new and useful Pulsating Water-Separator for Removing Rock, Grit, or Foreign Matter from Grain; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, and to the letters of reference marked thereon.

Figure 1, of the drawings represents a vertical longitudinal section on the line $y-y$, Fig. 1. Fig. 2 represents a cross-section on line $x-x$, Fig. 1.

The object of this invention is to provide means for separating from grain, and especially from wheat, by water pulsations, such particles of rock, chaff, and other foreign matter, as may be left intermingled therewith, after the grain has been acted upon by thrashing or cleaning machines of ordinary character. It is designed to thoroughly separate all grit from the grain so that it may be fed to reaping machines of exact and fine construction without danger of injuring the same.

In the accompanying drawings the letter A, designates a water-tight box or tank, and B, an inclined screen or sieve extending longitudinally in the upper portion of said tank, and suspended or supported therein, so that it is just submerged below the surface of the water with which the tank is designed to be nearly filled. The screen has a small mesh to retain the grains of wheat while allowing the smaller particles of grit to pass through into the lower portion of the tank. The tail C of the screen is sufficiently raised above the wire cloth bottom to dam up the grain to the depth of an inch or more, said grain being designed as the screen fills, to flow over the tail board into the chute in the end of the tank, whence it is discharged through a valve spout D.

An up and down reciprocating motion is given to the screen by means of small rotating cams a , on a shaft b , said cams being connected to the screen by suitable arms, c . This reciprocation produces upon the wheat grains

in the screen a pulsating action causing them to rise, loosen from each other and fall back at each pulsation. The particles of rock and grit being specifically heavier than the grains of wheat, are by these pulsating motions, gradually washed down through the grain to the bottom of the screen, which allows the finer grit to pass through its mesh but retains the larger particles. These larger pieces of rock and grit accumulate at the lower end of the screen being gradually shaken into a receptacle or pocket d , preferably at the side from which they may be taken, when there is a sufficient quantity. In order to cause a lateral movement of these larger particles of grit a slight lateral inclination may be given to the bottom of the screen.

The grain is fed into the hopper E, whence it passes by the hopper spout g , to the screen. While good thrashed grain will sink in water, some of the berries may require a little soaking, and in order to prevent these from floating along the surface of the water past the screen with the chaff, a canvas or other drag G is provided across the head portion of the screen to exert a submerging action on the berries, holding them until they are soaked sufficiently to sink. This drag extends transversely of the tank, its ends being connected to the sides thereof.

In order to let the water and sediment out of the tank, a discharge spout I is provided at its bottom portion.

The level of water is preserved by the surface spout J. If running water is employed, being supplied to the tank by a pipe K, the chaff and light stuff will float along the surface of the water, and be discharged through the spout J. A screen Z, just below the water surface, extends to the discharge end of the tank to prevent chaff covered grain from soaking and falling into the chute with the good grain.

I am aware that there are several ways of producing a pulsating effect of the water on the grain therein, and I do not therefore desire to be confined to the mechanism hereinbefore described for this purpose.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. In a separator for taking out grit and

foreign matter from grain, the combination of a tank, a pulsating screen therein, a hopper arranged to discharge onto said screen, an inclined discharge chute, and a chaff screen over said chute, substantially as specified.

2. In a pulsating water separator for taking out grit and foreign matter from grain, the combination of a tank, a screen therein, and a soaking drag over said screen, substantially as specified.

3. In a pulsating water separator for grain the combination of a vertically reciprocating screen submerged in a tank, an inclined discharge chute in the tank extending from the

tail of the screen and a soaking drag across the head portion of said screen, substantially as specified.

4. In a pulsating water separator for grain, a tank, a vertically reciprocating grit screen therein, a discharging chute or receptacle, a chaff screen thereover, and a soaking drag over the grit screen, substantially as specified.

In testimony whereof I affix my signature in the presence of two witnesses.

JAMES H. MONTGOMERY.

Witnesses:

JOHN S. PERKY,
J. M. STANLEY.

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF DENVER, COLORADO.

BREAD AND METHOD OF PREPARING SAME.

SPECIFICATION forming part of Letters Patent No. 548,088, dated October 15, 1896.

Application filed March 15, 1894. Serial No. 503,777. (No specimens.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Denver, in the county of Arapahoe and State of Colorado, have invented a certain new and useful Article of Food or Bread and the Preparation of the Same; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

An object of the invention is the production of an article of food or bread, consisting of externally-rough porous threads or filaments of wheat or similar grain, having the outer nutrition bran and gluten of the entire berry visibly mingled with the interior starchy portion thereof and adapted by their composition of entire grain-berries and their rough and porous thread-like or shred-like form to constitute, without other shortening or aeration, bread of especially light and wholesome character.

A further object of the invention consists in the novel art or method of preparing the grain of berry and reducing it to form without taking from the grain any of the beneficial qualities provided by nature and presenting the same in convenient form for serving as a superior article of food without the aid of experts or skilled labor now required to produce palatable bread.

The usual methods practiced in the manufacture of flour and the resultant bread therefrom are such as to detract from the natural and healthful properties possessed by the grain in its original state. The addition of shortening, yeast, baking-powder, alum, or other foreign ingredients to render the bread light is also detrimental, and the entire method consumes a large amount of time and labor.

According to the improved method which I am now about to describe, the wheat is taken in the whole or berry form, and after being cleaned and thoroughly washed is boiled until cooked, without destroying the whole or individual form of the berry. The time of boiling is usually about one hour. This operation, in addition to cooking the grains, removes from them the outer silicious coating

and adherent extraneous matter. It also destroys all insect life and removes the traces thereof. Before removal from the boiler the grain is seasoned with salt. The wheat, still in berry form, is, nevertheless, just after the boiling quite soft and its interior or starchy portion especially is watery. It can be easily mashed between the finger and thumb and is not in condition for proper compression until its inner and outer portions are brought more upon an equality in point of consistence. To this end the grain, being removed from the boiler, is allowed to dry for some hours—from twelve to twenty hours being usually sufficient—until the interior of the berry has, from the loss of some of its water, become more consistent. The grain should be constantly stirred or agitated during this part of the process to hasten the drying-out action and to prevent incipient fermentation. I prefer, therefore, to dry out the grain in rotating wire-cloth barrels or cage-tumblers. The berries should now have sufficient interior consistence to enable their outer and interior portions to be effectively incorporated with each other, such incorporation being accomplished by passing the grain between compression-rollers, one or both of which is provided with a series of fine circumferential grooves whereby the berries are mashed and their outer bran-coats, gluten layers, and starchy interior portion thoroughly incorporated together and forced into the grooves of the roller or rollers, whence the resultant food is discharged, by means of a comb or scraper, in the form of long fine filaments or threads of porous character and having a rough exterior admirably adapted to cause them to adhere together when being massed to form loaves or biscuit. The sinuous form and rough or jagged exterior shape of the filaments is designed also to provide small interstices throughout the mass, whereby the bread is thoroughly aerated and made very light.

The food as discharged from the rolls is ready for use without further cooking, or it can be shaped for baking in various ways. The food presented is pure wheat and all the parts of the berry are given to the consumer in attractive form. No chemical change is set up therein by the use of ferments or other

foreign ingredients, and the percentage of water in the food is much less than in ordinary bread.

The article as produced is a food or bread composed of superposed or massed layers or deposits of dry, externally rough, porous, sinuous threads or filaments of cooked whole wheat containing intermixed the bran, starch, and gluten of the entire berry, and which is absolutely free from leavening or raising material or their products.

The fine thread-like character of the component filaments of the bread and their disposition therein renders it tender, so that shortening is not required. All the nutrition and beneficial qualities of the berry are preserved in this admirable article of food, while its form gives it tenderness and lightness without the admixture of foreign ingredients.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. A food or bread composed of superposed or massed layers or deposits of dry, exter-

nally rough, porous, sinuous threads or filaments of cooked whole wheat containing intermixed the bran, starch, and gluten of the entire berry, and which is absolutely free from leavening or raising material, or the products.

2. The process of reducing cereals for food consisting, first, in cooking the grain with salt, after it has been thoroughly cleaned without destroying the whole berry form, second, partially drying the grain with constant agitation until its interior and exterior portions are of substantially the same consistency, and finally, compressing the grain to intimately commingle the outer or bran coat, gluten layers, and starchy, interior portions in the form of porous, rough filaments or threads, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

HENRY D. PERKY.

Witnesses:

J. M. STANLEY,
HARRY C. JAMES.

Correction in Letters Patent No. 548,086.

It is hereby certified that in Letters Patent No. 548,086, granted October 15, 1895, upon the application of Henry D. Perky, of Denver, Colorado, for an improvement in "Bread and Methods of Preparing Same," an error appears in the printed specification requiring correction, viz: In line 47, page 1, the word "corked" should read "cooked"; and that the said Letters Patent should be read with this correction therein so that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 29th day of October, A. D. 1895.

[SEAL.]

JNO. M. REYNOLDS,
Assistant Secretary of the Interior.

Countersigned:

S. T. FRIER,

Acting Commissioner of Patents.

DESIGN.

H. D. PERKY.

BISQUIT.

No. 24,688.

Patented Sept. 17, 1895.

Fig. 1.



Fig. 2.



WITNESSES

Geo. M. Anderson
Philip C. Mason

INVENTOR

*H. D. Perky**W. E. W. Anderson**his*

Attorney

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF BOSTON, MASSACHUSETTS.

DESIGN FOR A BISCUIT.

SPECIFICATION forming part of Design No. 34,039, dated September 17, 1895.

Application filed August 2, 1895. Serial No. 555,026. Term of patent 14 years.

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented a certain new and useful Design for Biscuits; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

Figure 1 of the drawings is a perspective view of the invention, and Fig. 2 is an end view of same.

This invention has relation to a certain new and original design for biscuits; and it consists in the novel form and configuration thereof, as hereinafter described, and shown in the accompanying drawings.

The leading feature of the design consists in a biscuit, which presents a fibrous interstitial appearance, showing superimposed layers or irregular interlacing threads or fila-

ments, which are wound or disposed in such loose relation to each other that the threads or filaments of the inner layers are visible from the surface to a greater or less degree through the interstices of the outer layers.

The general form of the biscuit shown in the drawings, when viewed in plan, is that of a parallelogram, and when viewed in end elevation or cross-section is a flattened oval with slight creases along the longitudinal edges, its distinguishing characteristic being mainly, as above stated, its fibrous interstitial appearance.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The design for a biscuit, substantially as herein shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

S. A. TERRY,
A. W. TERRY.

(No Model.)

4 Sheets—Sheet 1.

H. D. PERKY.

MACHINE FOR REDUCING AND PREPARING CEREALS FOR FOOD.

No. 571,284.

Patented Nov. 10, 1896.

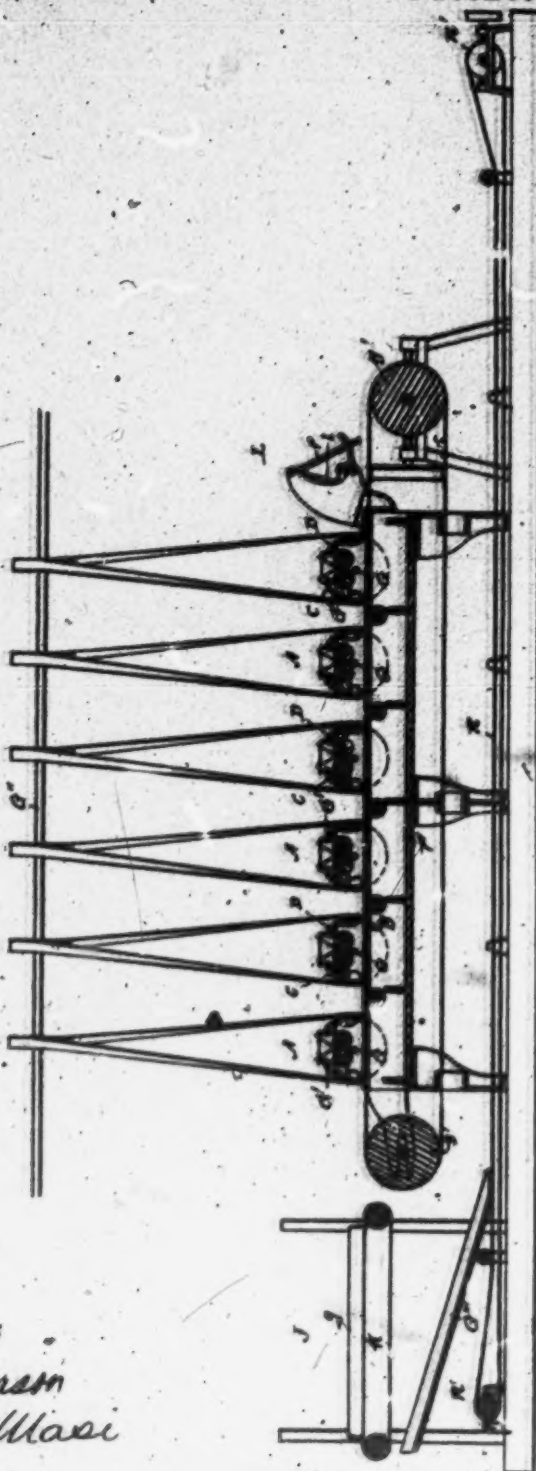


Fig. 1.

WITNESSES

G. W. Anderson
Phillips

INVENTOR

Henry D. Perky
E. W. Anderson
his Attorney

(No Model.)

4 Sheets—Sheet 2.

H. D. PERKY.

MACHINE FOR REDUCING AND PREPARING CEREALS FOR FOOD.

No. 571,284.

Patented Nov. 10, 1896.

Fig. 3

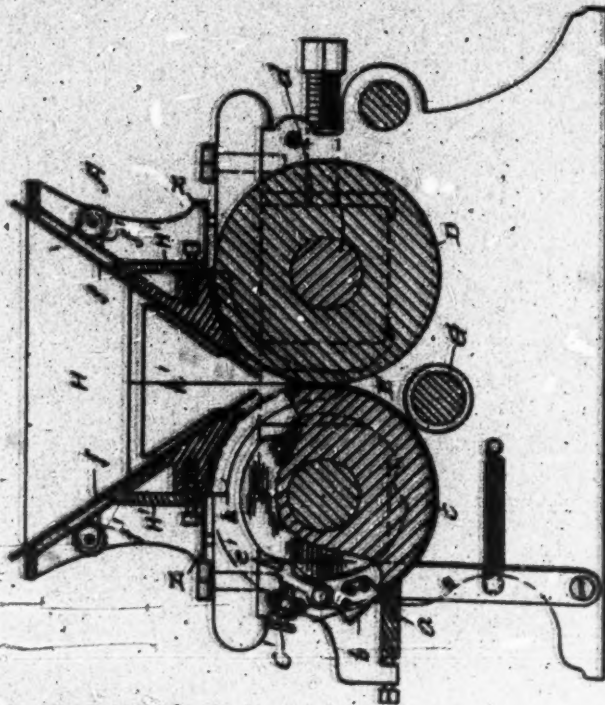
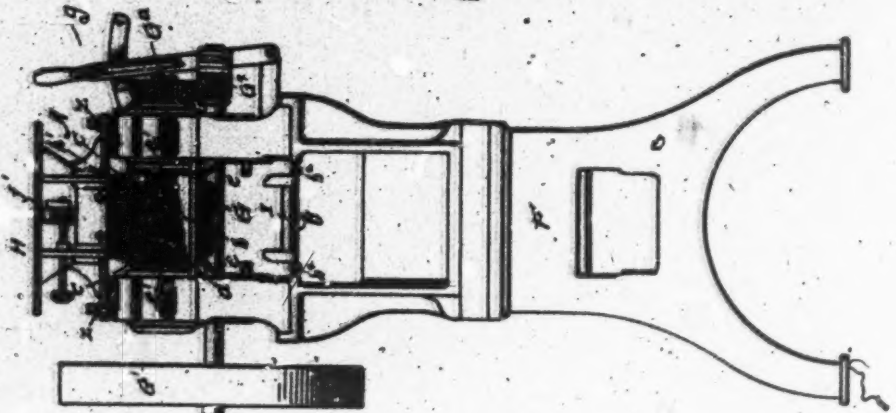


Fig. 2.



WITNESSES

Gyandrom
Phillel Masi

INVENTOR

Henry D. Perky

J. E. W. Anderson

his Attorney

(No Model.)

4 Sheets—Sheet 1.

H. D. PERKY.

MACHINE FOR REDUCING AND PREPARING CEREALS FOR FOOD.

No. 571,284.

Patented Nov. 10, 1896.

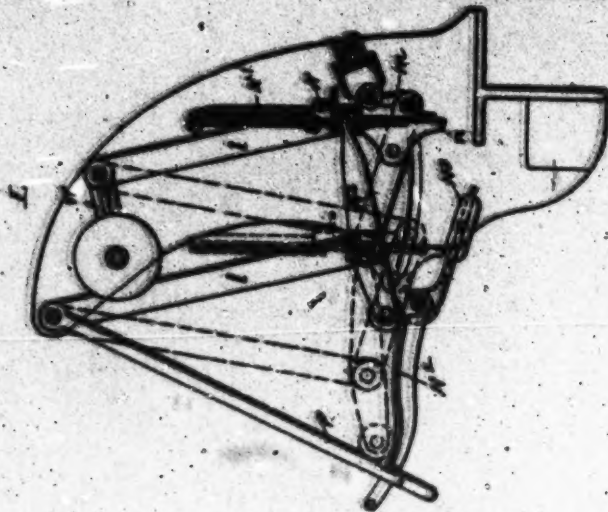


Fig. 4.

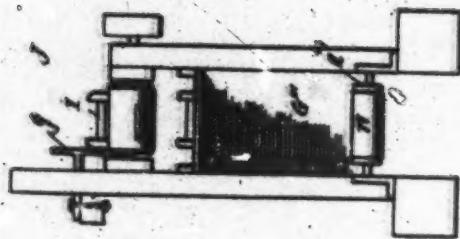


Fig. 5.

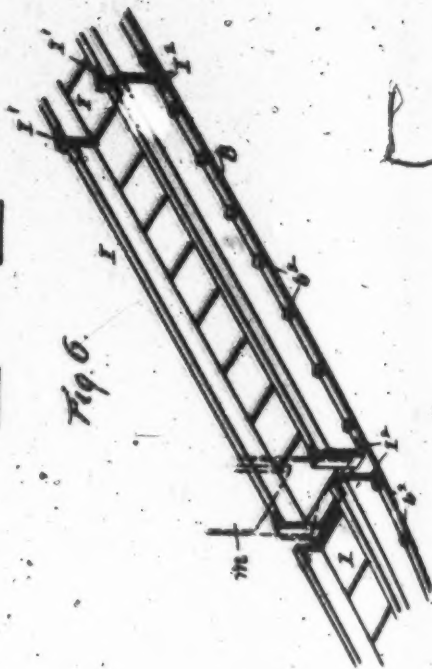


Fig. 6.

WITNESSES

L. J. Morrison
Phillips

INVENTOR

Henry D. Perky
W. W. Anderson
 his Attorney

(No Model.)

4 Sheets—Sheet 4

H. D. PERKY.

MACHINE FOR REDUCING AND PREPARING CEREALS FOR FOOD.

No. 571,284.

Patented Nov. 10, 1896.

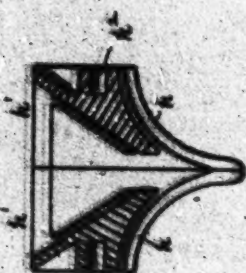


Fig. 8

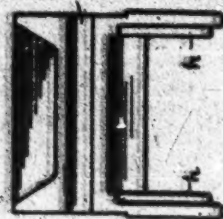


Fig. 9

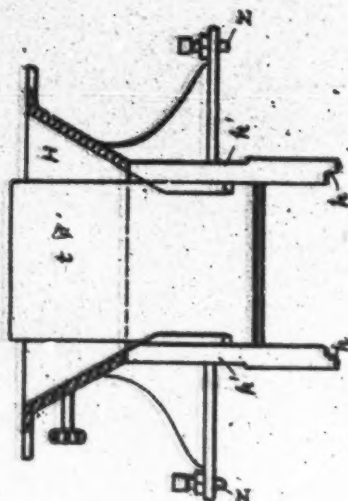


Fig. 7

WITNESSES

S. M. Ambrose
 Phil. C. Masi

INVENTOR

H. D. Perky
 By E. W. Ambrose
 his Attorney

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF WORCESTER, MASSACHUSETTS.

MACHINE FOR REDUCING AND PREPARING CEREALS FOR FOOD.

SPECIFICATION forming part of Letters Patent No. 571,284, dated November 10, 1896.

Application filed February 7, 1896. Serial No. 578,304. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Machines for the Reduction and Preparation of Cereals for Food; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a representation of a central vertical section through the machine. Fig. 2 is an end view of the cutter-head and supporting-frame receiving-belt in section. Fig. 3 is a central vertical section through the cutter-head with roller C broken to show cam at back. Fig. 4 is a sectional view of the section-cutter. Fig. 5 is an end view of the trough-feeder. Fig. 6 is a perspective view showing the troughs and the direction of the section-cutter; the knife of the same being in dotted lines. Fig. 7 is a sectional view of one of the hoppers of the reducing-machines detached, the plane of section being at right angles to that of the section shown in Fig. 2. Fig. 8 is a detail view, partly in section, of the sectional hopper with A detached. Fig. 9 is a side view of the same.

The object of this invention is to provide a competent and efficient machine for the reduction of grain in large quantities to thread-like or shredded form wherein the exterior and interior portions of the grain-berry are properly commingled, and suitable rapid disposition of the reduced product in layers sectionally divided and arranged for convenience in the manufacture of biscuits or forms of bread is effected.

In carrying out this invention I provide upon a suitable frame F a series of reducers or shredding-heads A, which are arranged in line with each other, as indicated in the drawings, Fig. 1. Each reducing-head is provided with a pair of reducing-rolls C and D, preferably, whereof one roll, C, is grooved. The grooves of the roll extend circumferentially

and are of small or fine character and usually V-shaped in cross-section. The number of grooves may be about twenty to the inch. A groove being a width of one-fiftieth of an inch by about the same depth and a bottom surface of about one-sixth of the depth will serve an excellent purpose. The back roll D of the pair or set is smooth and its cylindrical surface is designed to be in exact and neat contact with that of the grooved roll. The rolls are geared together to run in contact, as indicated at E. The bearings for one of the rolls, preferably the back roll, are adjustable, as indicated at d. The rolls are provided with annular rabbets at their ends, as indicated at c, to form bearings for the inside faces of the concaves h of the lateral walls h' of the hopper H, which is removable. The grooved roll is provided with a circular notched cam C' at each end. Corresponding notches in the two cams should, as is obvious, be exactly opposite each other.

G indicates the driving-shaft, carrying a clutch-pinion G^x, adapted to engage the gear-wheel G^a of the front roll. The shifting-lever engages the clutch and enables the operator to disengage the driving mechanism from the rolls of the head in an instant, causing said rolls to cease working. Each drive-shaft is provided with a pulley G', which is belted to a line-shaft G'', whereby all the rollers of the reducing-heads are run at the same speed.

Each reducing-head is provided with a comb or scraper a, which is provided with teeth to engage the grooves of the roller C. A spring-actuated cleaner b, located in inclined position above the comb, is carried by the lever-arms e, which are provided with adjustable lugs e' to engage the notched cams of the grooved roller. This cleaner thereby has an intermittent motion toward the surface of the grooved roller and serves to push back to this roller such accumulations of the product material as may occur upon the comb or scraper a.

It may sometimes happen that the rabbeted bearings upon the end portions of the two rolls may not be exactly in alignment with each other. It is therefore advisable to provide the hopper with means whereby it can be adjusted to suit such a condition. To this end the lower portion of the hopper is made in two

sections *h'*, which are separate from the main frame *H'*, each section having a sliding engagement with said frame, as indicated at *h''*. The concaves *h* are formed on these sections, as shown in Figs. 7 and 9. By this construction it will be apparent that each section *h'* can be adjusted to suit its bearings on its subjacent roll independently of the other section.

10 Inclined cut-off slides *f* are seated in ways of the hopper-walls and are provided with rack-and-pinion devices *f'* in order to adjust the feed of the grain to the rolls or to cut it off. The inclination of the slides enables the operator to cut the flow off close to the rolls. 15 The hopper is supported upon adjustable set-screws, as at *Z*.

Underneath the series of reducing-heads the frame *F* is provided with a series of idler-rollers for the feed branch of the endless receiver-belt *B* and below this with a return-way. The traveling belt *B* is provided with lateral studs or guides *b'*. *B* indicates the driving and take-up pulleys for this belt.

25 At one end of the machine is provided a trough-feeding ledge or table *J*, having an adjustable guide or flange *g* (see Fig. 5) to insure feeding the troughs or sectional receivers *I* (see Fig. 6) in line with the receiver-belt *B*. This table is provided with a short feeding-belt *K*, which is designed to be driven at a speed somewhat faster than that of the main belt *B*, in order to insure closing the troughs or sectional receivers in abutted end-to-end 30 position on the main belt. These sectional receivers have lateral flanges or walls and are open at their ends, which are shod with metal, as indicated at *I'*, to avoid undue wear. At one end each trough is provided with catch lugs or projections *I'* for the automatic operation of the cutter *m*. This cutter (see Fig. 4) is secured upon the frame beyond the last reducing-head. Its frame is provided with bearings for the parallel-motion hanger *l*, to 35 which is secured the knife-frame *N*, carrying the knife *m*, which is connected to said frame by a retracting-spring *N'*. This frame or carriage is provided with lugs at its lower corners, as indicated at *n*, which are designed to be engaged by the catch projections *I'* of the sectional receivers *I*. A lever *K'* is pivoted to the hanger and engages a bearing of the knife by one of its arms. Its other arm, usually provided with an antifriction-roller, en- 40 gages a cam-arm *N'*, which is pivoted to the fixed frame of the cutter and is counterbalanced, as at *N''*, to give it an upward motion to engage the trip-arm *p*. The hanger *l* is returned to normal position by means of the 45 weighted arm *W*.

The grain, having been boiled, salted, and dried to proper consistency, as explained in Letters Patent No. 548,086, dated October 15, 1895, is fed into the hoppers of the reducing-machines and is reduced by their grooved rollers to shred or thread like form, each head 50

depositing a layer of the shred-like product upon the traveling sectional receiver. These layers are deposited in successive thickness of the product upon the receiver gradually increased to the extent of the accordance with the number of reducing-heads composing the machine or some portion of them as may be in gear. In order to form biscuit of fair size, I design to use some thirty-odd heads in the gang. As the trough or section of the receiver approaches the outter the knife-frame moves forward and the knife is automatically reciprocated vertically in such a manner as to transversely divide the product into sections at the junction of the trough with the feeding one. The cam-arm of the cutter engaging the trip-arm becomes disengaged, the trough passes forward, and the hanger turns to original position. The cam-arm is set in engagement with the trip-arm for the next receiver section or trough. Below the receiver-belt is the trough return *R*, which runs upon a roller-way and is provided with driving and adjusting pulleys (indicated at *R'*). An upwardly-inclined guide *G''* is provided under the trough-feeding table *J* and serves to raise the troughs automatically to suitable position to be taken by an attendant and fed onto the belt *K*.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a series of reducing or shredding heads, the endless carrier-belt arranged to travel below the said heads, a series of open-ended receivers designed to be carried on said belt, a cutting device located over the rear portion of said belt and adapted to be operated by the engagement thereof of the receivers as they pass thereunder, means whereby said receivers may be returned to feeding position, substantially as specified.

2. The combination of the series of reducing or shredding heads arranged in line, a roller-way below said heads, the endless belt arranged to run over said way, the feed-belt at the front end of said belt, its feed-belt line with the first-named belt and designed to be driven at a slightly greater speed, the sectional receivers, the automatic cutter, the return belt and chute, substantially as specified.

3. The combination with the series of reducing-heads, the endless belt thereon, and the sectional receivers having the catch lugs or projections, of the section-cutter, including the parallel-motion hanger, the knife-frame secured to said hanger, and having trip-lugs for engagement with the lugs of the receivers, the knife, its retracting-spring, the cam-and-lever devices for forcing the knife to its work, substantially as specified.

4. The combination with the receivers having trip or catch lugs, of the parallel-motion

the knife-frame secured to said hanger and adapted to be engaged by the said trip of said lever, means whereby said engagement and the movement of the hanger caused thereby causes the knife to descend to its work, and means for retracting the knife after the work has been made and for returning the knife to normal position; substantially as specified.

The section-cutter having the parallel-shaft, counterbalanced hanger, the cutter-frame secured thereto and having a trip-lug projection, the cutter, the retracting-spring lever, the counterbalanced cam-lever, the roller which secures said cam-lever in operative position, and the lever having one arm engaging a bearing of the knife and its outer end engaging the said cam-lever, substantially as specified.

4. In a grain shredding or reducing machine, the combination with a pair of reducing rolls one of which is circumferentially grooved, and the comb or scraper for removing the product from the grooved roll, of the second scraper arranged to play back and forth upon the upper surface of said scraper, a pair of oscillating, spring-actuated, pivoted levers to which said scraper is attached, and cams upon the shaft of one of the reducing-rolls, and adjustable lugs carried by

said levers and engaging the respective cams, substantially as specified.

7. A grain shredding or reducing machine having a pair of rolls or cylinders journaled to rotate in neat contact with each other, one of said rolls or cylinders being circumferentially grooved, the hopper having the sectional, adjustable lateral walls provided with bearings on the ends of said rolls, the cut-off slides seated in ways of the hopper-walls, the driving mechanism for said rolls or cylinders, and clutch-gear whereby said rolls or cylinders may be disconnected from the driving mechanism, substantially as specified.

8. In a grain reducing or shredding machine, the combination with the reducing-rolls having the rabbeted end portions, of the vertically-adjustable hopper having a bearing upon said rabbeted end portions, the bearing-sections of the hopper being separate from the main frame of the hopper and capable of an independent endwise adjustment with relation to the said rolls, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

S. N. ROGERS,
J. M. STANLEY.

(No Model.)

H. D. PERKY.

ROLL REDUCING MACHINE FOR PREPARING FOOD.

No. 598,745.

Patented Feb. 8, 1898.

Fig 1.

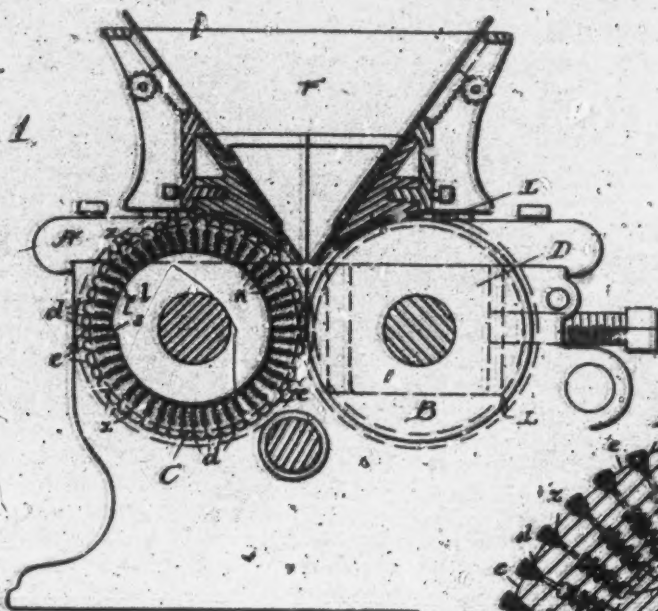


Fig 2.

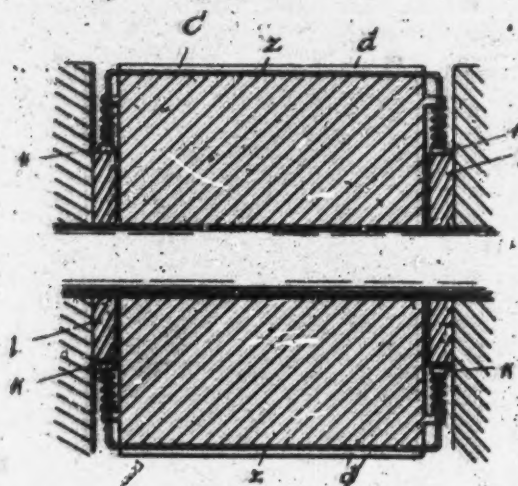


Fig 3.

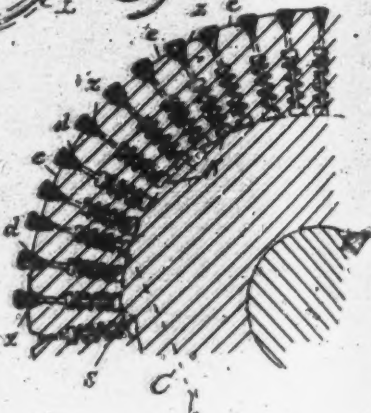
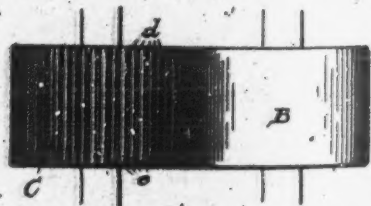


Fig 4.



WITNESSES

E. M. Anderson
Philadelphia.

INVENTOR

*H. D. Perky**E. W. Anderson**his* Attorney

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF WORCESTER, MASSACHUSETTS.

ROLL REDUCING-MACHINE FOR PREPARING FOOD.

SPECIFICATION forming part of Letters Patent No. 598,745, dated February 8, 1898.

Application filed August 3, 1897. Serial No. 646,969. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Roll Reducing-Machines for the Preparation of Food; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a transverse vertical section through a machine embodying my invention. Fig. 2 is a longitudinal section through the roll C and its bearing. Fig. 3 is a transverse section through a portion of said roll, and Fig. 4 is a plan view of the two rollers removed.

In the present invention I have designed to provide a machine for commingling the exterior coats and gluten layer of the grain-berry with its interior portion or starch, reducing the same to definite form for use as food; and to this end I have devised the following mechanism:

The material upon which it is designed to operate is grain, and especially wheat, which has been duly cleaned and cooked and partially dried in order to bring its exterior and interior portions to an equalized consistency, and yet maintain it in the entire or berry form.

In the accompanying drawings the letter A designates the framework of a machine having bearings for back roll B and the front roll C. These rolls are turned exactly true, and one of them should be provided with box-bearings D for purposes of adjustment, as the rolls are designed to be run in contact with each other. One of the rolls, B, may have a plain cylindrical surface. The other roll, C, is provided with longitudinal grooves of V-form in cross-section, a succession of such straight or longitudinal grooves extending parallel to each other around the roll. The grooves are separated by lands c of the cylindrical surface.

F represents the hopper of the machine,

into which the material, being the prepared grain above referred to or shreds of the same produced by machines of proper character, is fed. The rolls being rotated by means of suitable gearing (indicated at L) cause the material to be pressed into the grooves of the roll C, from which it is discharged in the form of strips of definite length in accordance with the width of the roll in the following manner: Fitting neatly in the bottom of each groove is a steel wire or strip of corresponding cross-section, (indicated at z,) the ends of which are secured to movable holders k. At each side of the grooved roll is attached to the framing a cam-guide l, having an eccentric curvature l' sufficient to cause the wire to be protruded from its seat in the bottom of the groove when these curvatures are engaged by the movable holders k. The cam-guides are located below the contact-line of the rolls sufficiently to provide for the discharge of the shreds or strips after their formation. The discharging-strips are drawn back to their seats in the grooves by spring action or otherwise. The cams may have slight steps, as indicated at s, in order to cause a slight quick movement of the wire z to facilitate its discharging action.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a pair of reducing-rolls journaled to run in neat surface contact with each other, one of said rolls having therein, a series of longitudinal grooves, of a wire or strip movably seated in the bottom of each of said grooves, movable holders to which these wires or strips are attached, and cam-guides engaged by said holders to successively protrude said wires or strips from their seats, together with means for again withdrawing the same, substantially as specified.

2. The combination with a pair of reducing-rolls journaled to run in neat contact with each other, one of the said rolls having therein a series of parallel, longitudinal surface grooves of V form in cross-section, and a feed-hopper arranged to discharge between said rolls, of a wire or strip movably seated in the bottom of each of said grooves, and means whereby the same is momentarily pro-

truded during each rotation of the roll together with means for returning the same to its seat after each protrusion, substantially as specified.

- 5 3. The combination of a pair of reducing-rolls, one of which has therein a series of parallel longitudinal grooves, the wires or strips one of which is movably seated in each of the said grooves, the movable holders to
10 to which said wires or strips are attached at

their end portions, the springs connected to said holders, and the stepped cam-guides engaged by the said holders, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

SAML. N. ROGERS,
JOHN S. PERKY.

No. 614,338.

H. D. PERKY.

Patented Nov. 15, 1898.

MACHINE FOR REDUCING CEREAL FOOD PRODUCTS TO FORM FOR USE.

(Application filed May 21, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 5.

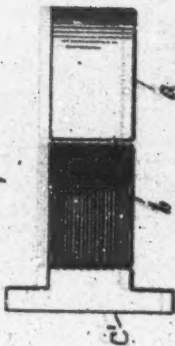


Fig. 1.

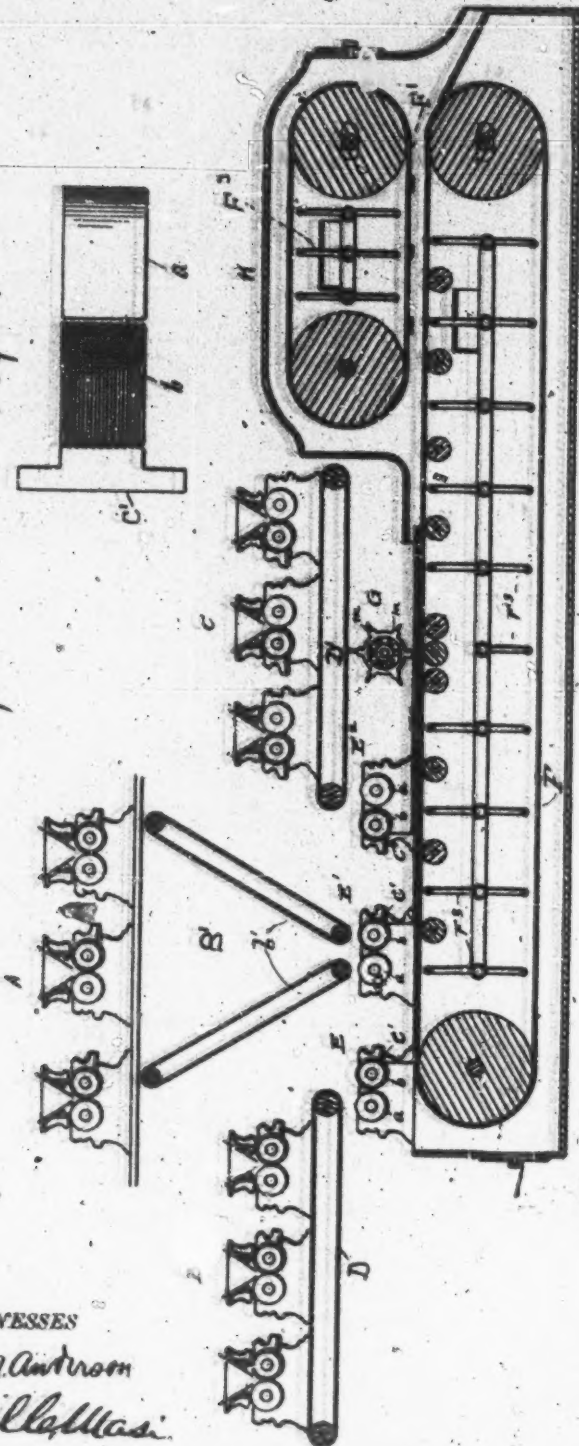
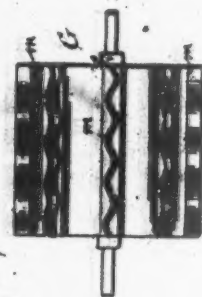


Fig. 4.



Fig. 3.



WITNESSES

G. M. Anderson
Phileas Masi

INVENTOR

H. D. Perky
G. W. Anderson
his Attorney

No. 614,338.

H. D. PERKY.

Patented Nov. 15, 1898.

MACHINE FOR REDUCING CEREAL FOOD PRODUCTS TO FORM FOR USE.

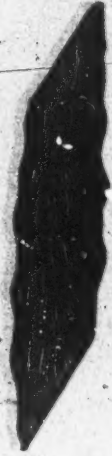
(Application filed May 21, 1896.)

(No Model.)

2 Sheets—Sheet 2.



Fig. 6



WITNESSES

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INVENTOR

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T. E. W. Anderson

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UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF WORCESTER, MASSACHUSETTS.

MACHINE FOR REDUCING CEREAL FOOD PRODUCTS TO FORM FOR USE.

SPECIFICATION forming part of Letters Patent No. 614,338, dated November 15, 1898.

Application filed May 21, 1896. Serial No. 502,493. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Machines for Reducing Cereal Food Products to Form for Use; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a central longitudinal section through the devices constituting the invention, being partly diagrammatic. Fig. 2 is a sectional view showing the evaporating-chamber in connection with the oven by a continuous belt. Fig. 3 is a detail view of the cutter or indenter. Fig. 4 is a sectional view illustrating the projections upon the roller *b*. Fig. 5 is a plan view of the rolls *a* and *b* and the scraper. Fig. 6 is a perspective view of the wafer.

The object of this invention is to provide means whereby grain, and especially wheat in its entire or berry form, having been properly cleaned and cooked, is reduced to the form of a band or ribbon in which the interior and exterior portions of the grain or berry are intimately commingled, such band or ribbon being separated or indented transversely to provide sections of suitable size and shape for baking into crackers or wafers. It is also designed to provide means whereby such bands or ribbons of the grain product may be overlaid or pliated and transversely separated or indented in such a manner as to provide sections of suitable size for baking, each section consisting of several thicknesses or layers duly connected at the edges of the section. It is also designed to provide means for baking these sections continuously as they are formed, and, finally, it is designed to provide means for ornamenting the sections superficially by raised or indented configurations in order to give them an attractive appearance.

In the accompanying drawings I have indicated at A, B, and C several sets or gangs of

shredding devices, substantially of the character described in detail in Letters Patent No. 502,378, dated August 1, 1893, into the hopper of which the grain in its entire or berry form is fed after it has been properly cleaned and properly cooked, preferably in the manner substantially as set forth in Letters Patent No. 548,086, dated October 15, 1895. The number of shredding-heads in each set or gang is determined by the thickness of the ribbon or band desired and by the rapidity of production contemplated. These roll-shredders discharge the material in the form of threads or shreds, in which the exterior coats and the gluten layers of the grain are intimately commingled with the interior starch. The threads or shreds are transferred by means of a hopper guide or carrier to the hopper of the band-rollers *E E' E²*, there being one band-roller to each set or gang of reducing-rollers.

The band-roller consists of a pair of rolls *a* and *b* and a discharger or cleaner *C*, being similar to the shredding or reducing head in its main features of construction, the rolls, however, not being in contact, as the reducing-rolls are, but being separated from each other a distance corresponding to the thickness of the band desired. The front roll *a* may have a plain cylindrical surface or it may be circumferentially grooved. The back roll *b* may be plain or it may have shallow grooves or indentations or slight projections of ornamental design, such projections or indentations having beveled walls or rounded angles to provide for the ready detachment of the band as it passes from the rolls to the carrier *F*.

In the arrangement shown in Fig. 1 the three reducing-machines (designated by B) are arranged to discharge upon an endless carrier *D*, which transfers the product to the hopper of the first band-roller *E*. The second set of reducing-machines (marked A) discharge into a hopper *B'*, whose lateral walls may, as shown, consist of endless traveling bands *b'*. This hopper discharges the material to an intermediate band-roller *E'*. The third set of reducing-machines (marked C) discharge onto an endless carrier *D'*, which delivers the product to the third band-roller *E²*.

One band-roller, with its set or gang of re-

ducing-heads, will provide a single band upon the carrier F, where by means of a cutter or indenter G it may be separated or indented in a sectional manner to form crackers or wafers. The carrier F is preferably a traveling band of steel adapted to transport the separated or indented band through the oven K, which is preferably heated by gas, as indicated at P, which designates gas-burners. F designates an upper baking-band, heated by similar burners. In passage through this oven the wafers are baked, and they are discharged at the end of the carrier in crisp condition. This carrier may also extend beyond the oven into an evaporating-chamber, as indicated at P, or it may discharge its contents upon a carrier which moves more slowly through such evaporating-chamber. Said chamber is preferably provided with an exhaust-fan F'.

The cutter or indenter G may be of rotating character, as indicated, its blades being rectilinear or curved or of wave-like or other shape in accordance with the design of the cracker or wafer desired to be produced. The cutter is geared to run at the same rate of speed as the carrier.

When it is desired to form a wafer of two or more layers or thicknesses, two or more band-rollers, with their respective sets or gangs of reducing-heads, are employed, the arrangement being in succession, or so that the band produced by the second band-roller will overlap that produced by the first band-roller and will be overlaid by that produced by the third band-roller. In order to insure the connection of edges of the section of a band of several layers, it is designed to provide the cutter or indenter with pressing-shoulders, as indicated at M. In this manner it is designed to provide wafers of several layers or folds each of which is entire or of plicated character when finished in baking.

While the means described are designed for the production of these crackers or wafers in large quantities suitable for commercial supply, manipulation of the material is avoided, so that consumers are protected, in an important manner, from a sanitary point of view.

In making a wafer of two or more layers or thicknesses two or more band-rollers may be employed in series, the first band-roller having its grooved roll and scraper or comb

in the rear of the plain roll and the last band-roller having its grooved roll and scraper in front of its plain roll, as indicated in Fig. 1. The ribbon of material falling from the first roller upon the receiving-carrier will have an under surface of finely ribbed or corrugated configuration, the size of the ribs or corrugations depending upon that of the grooves of the roll, which may be as small or as fine as those of a grooved reducing-roll. This ribbon of material will form the under layer. The upper layer of material, which is formed by the last band-roller, will have its upper surface of similar ribbed or corrugated character. Intermediate band-rollers may be employed to provide intermediate layers where the wafer is to consist of more than two layers. In any case, however, when the mechanism is arranged, as indicated, with the first and the last band-rollers in reversed position the upper and under surfaces of the wafer will present an ornamental surface of fine ribs or corrugations, and when the bands of material are rolled thin by means of finely grooved rolls referred to such rolls will have a comminuting or shredding effect such as will reduce the cooked wheat when fed directly into the hopper of the band-rollers, so that the prior action of reducing-rolls is not always required.

The reducing-heads used in combination with the band-rollers are designed to provide for a more intimate and thorough commingling of the exterior layers with the interior portion of the grain or berry, and they serve an important purpose in that regard.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The combination with one or more band-rolling machines, and an endless traveling carrier upon which said machine or machines discharge their product, of a rotary indenter or cutter above said band, and having a series of blades provided with pressing-shoulders, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

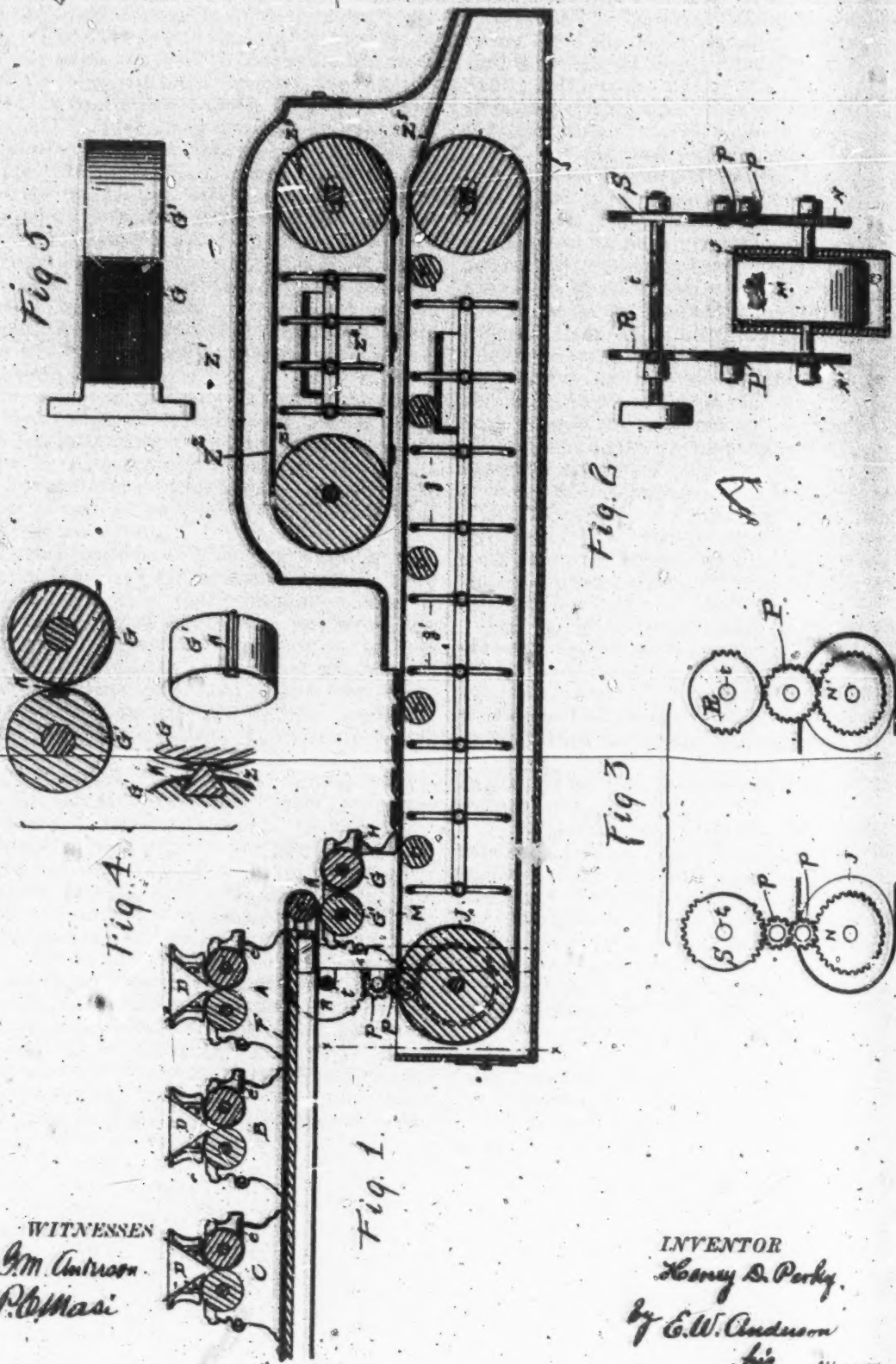
SAML. N. ROGERS,

JOHN S. PERKY.

APPARATUS FOR MAKING FOLDED WAFERS.

(Application filed Aug. 17, 1907.)

(No Model.)



WITNESSES
J. M. Anderson
P. B. Masi

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

INVENTOR
Henry D. Perky
E. W. Anderson
his Attorney

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF WORCESTER, MASSACHUSETTS.

APPARATUS FOR MAKING FOLDED WAFERS.

SPECIFICATION forming part of Letters Patent No. 618,288, dated January 24, 1899.

Application filed August 17, 1897. Serial No. 848,538. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Making Folded Wafers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a vertical longitudinal section of apparatus embodying my invention. Figs. 2 and 3 are detail views of the gearing in side and end elevation, respectively; and Figs. 4 and 5 are detail views showing the rollers G G'.

The object of this invention is to provide apparatus for making folded wafers from grain, and especially from wheat in the entire or berry form.

The grain or wheat is first cleaned and cooked, preferably as described in Letters Patent No. 548,080, dated October 15, 1895. It is then partially dried in order to render the interior and exterior portions of the berry of more even or similar consistency, in which condition it is ready to be fed to the reducing or shredding rolls which are designed to effect an intimate commingling of the interior phosphatic and nitrogenized layers with the interior carbonaceous or starch portion. The shreds or threads of the material discharged from the reducing-rolls are massed and rolled into ribbons or bands which are rolled in layer form to provide wafers of several plies or thicknesses.

In order to avoid handling the material, mechanism is provided as follows:

The letters A, B, and C represent reducing-machines substantially of the character described in Letters Patent No. 502,378, dated August 1, 1893, in which finely-grooved rolls are employed to reduce the grain which is fed into the hopper D to shredded form; the shreds or threads being discharged by means of the combs or cleaners e, also described in said Letters Patent. The threads or shreds are transferred by means of an endless car-

rier or conveyer hopper F to the band-forming rolls G G', which are not run in contact like the reducing-rolls, but are adjusted apart from each other in accordance with the thickness of the band to be produced. One of the rolls G is usually grooved circumferentially, while the other, G', is plain or provided with shallow elevations or depressions of ornamental configuration. A scraper or discharger H is provided in connection with the band-roll G in order to clear the band therefrom after its formation.

K indicates the cutter or longitudinal separating-rib, which may be provided on one of the band-rolls, while the other is grooved or depressed lengthwise, as at Z, to engage the cutter as the rolls rotate. The groove Z should be of an even depth with the fine circumferential grooves of the roll in order that the action of the scraper or discharger H shall not be interfered with.

The ribbon or band of material is designed to be separated into even lengths by this cutting mechanism, and as these lengths are discharged by the scraper they fall upon a traveling band or endless carrier M, which may be of steel, in order that the wafers formed thereon may be passed through an oven and quickly baked. The oven is indicated at Z'.

The driving pulley or drum J of the carrier band is designed to have an intermittent rotary reciprocating motion in order to give the endless band a longitudinal reciprocating movement of suitable character to effect the folding. At each end of its shaft is provided a gear-wheel N or N', which engage, respectively, idlers P p p, which are in turn engaged, respectively, by segment gear-wheels R and S on the ends of the drive-shaft t. The toothed segments of the wheel S should have a little more than twice the span of those of the wheel R and should alternate therewith in order that the driving-pulley J may be turned forward more than twice as far as it is turned backward, the reversal being effected by means of idlers.

In the arrangement shown in the drawings I have shown the idler P interposed between the gear-wheel N' and the drive gear-wheel R, while between the gear-wheels N and S are two small idlers, whose combined diameter is equal to the diameter of the idler P. It will

be obvious that by means of these idlers the gear-wheels B and S will drive the pulley or drum J alternately in opposite directions. Other suitable gear may, however, be employed. By this means as the ribbon of the material falls upon the endless carrier it moves with it forward a short distance, then backward the same distance, and then forward, so that a three-ply wafer is formed with scroll ends. The carrier continuing to move forward receives the first portion of the next length of the ribbon of material, and by its reversals forms another wafer in rear of the first, and in such manner the operation of forming the wafers may be carried on continuously, and as the baking may also be effected upon the carrier on which the wafers are folded in a continuous manner it is evident that these wafers can be finished in shape before they have time to settle.

The carrier-band may be heated in the oven Z' by means of gas-jets z' or other suitable means. Z' indicates a top baker, which may consist of a second endless band carried and driven by the drums Z' and heated by gas-jets Z' or other suitable means.

The distance between the baking-surfaces of the two bands should be about equal to the thickness of the wafers.

Z' designates a discharging chute at the distant end of the oven, through which the wafers are automatically discharged as the carrying-band passes around its carrying roll or drum.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with one or more reducing-machines, and with a carrier or traveling receiver upon which they discharge, of the band-forming rolls which receive the product from said carrier or receiver, a traveling carrier which receives the product from the said rolls, and gear whereby the said carrier has a reciprocatory forward movement, substantially as specified.

2. The combination with the band-forming rolls, of the traveling carrier working underneath said rolls, and gear whereby said carrier is actuated to a reciprocatory forward movement, substantially as specified.

3. The combination with the band-forming rolls of the endless traveling carrier-belt working underneath said rolls, its carrying and driving pulleys, and gear for imparting to said driving-pulleys an intermittent rotary reciprocatory motion, substantially as specified.

4. In a machine of the character described, the combination with the band-forming rolls, one of which has a peripheral longitudinal rib, and the other a longitudinal groove or depression, of the endless traveling carrier-belt working underneath said rolls, and gear whereby said carrier-belt may be actuated to a reciprocatory forward movement, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

SAML. N. ROGERS,
JOHN S. PERKY.

No. 867,892.

Patented Feb. 12, 1901.

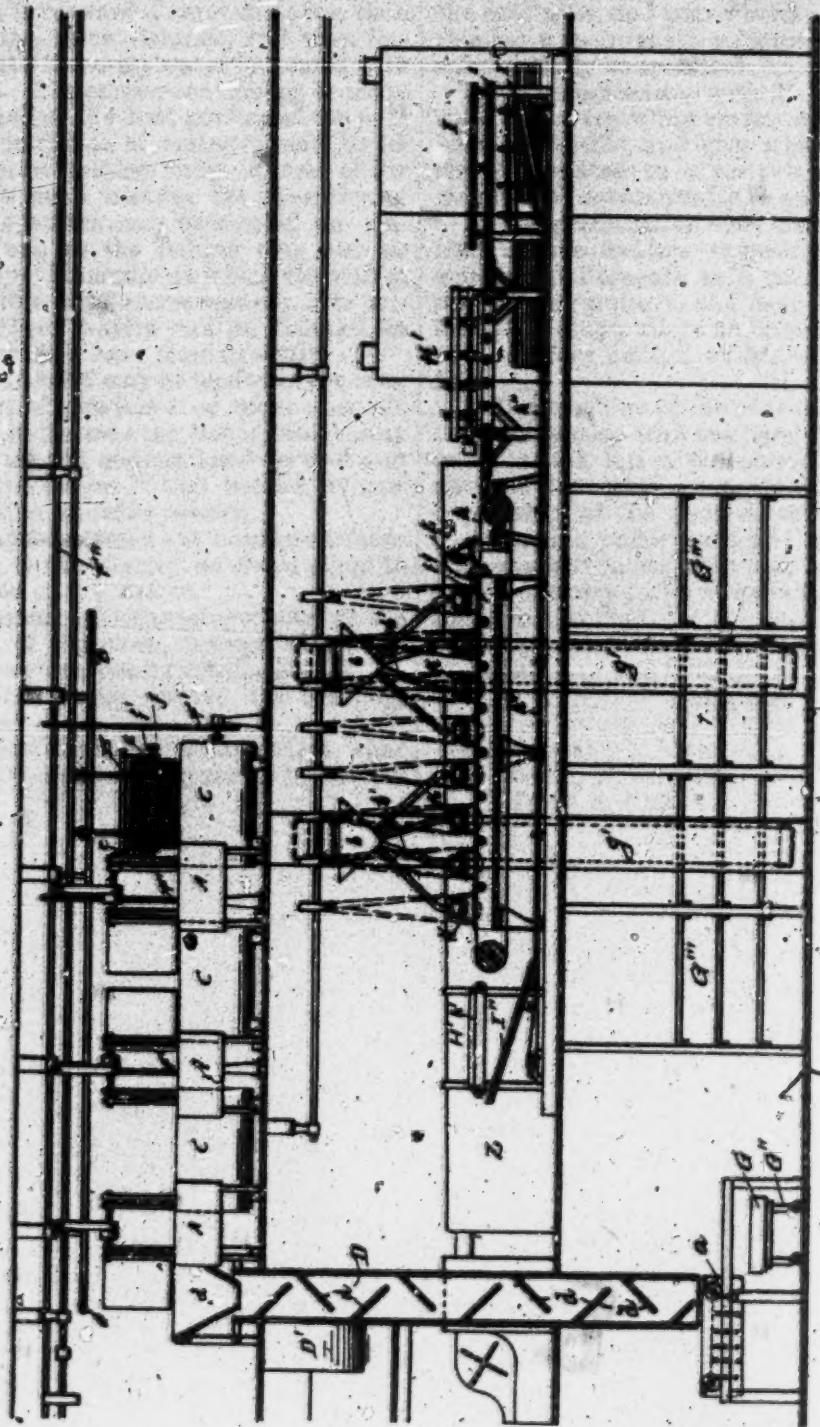
H. D. PERKY.

APPARATUS FOR MANUFACTURING CEREALS INTO FORMS OF FOOD OR BREAD.

(No Medal.)

(Application filed Feb. 27, 1939.)

7 Sheets—Sheet 1



WITNESSES

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Patented Feb. 12, 1901.

APPARATUS FOR MANUFACTURING CEREALS INTO FORMS OF FOOD OR BREAD.

(No Model.)

(Application filed Feb. 27, 1899.)

7 Sheets—Sheet 2.

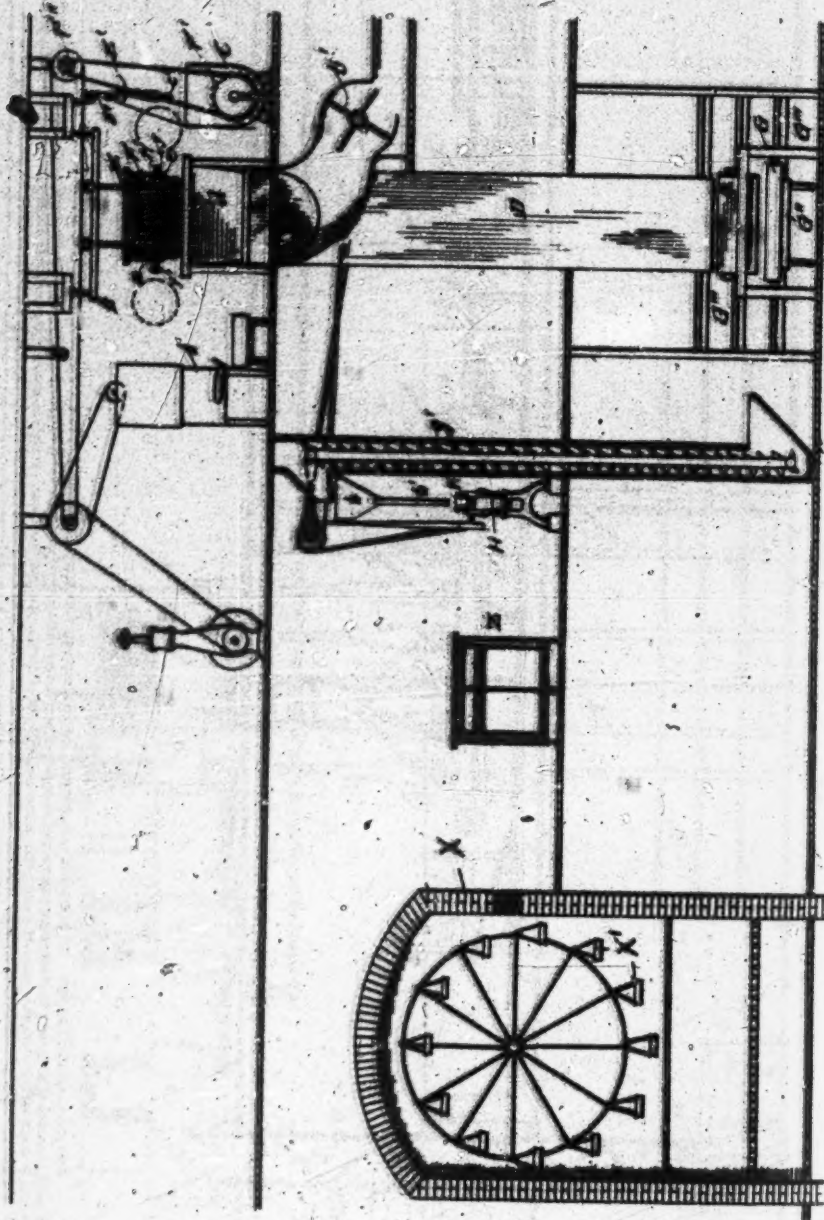


Fig. 2.

WITNESSES

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Patented Feb. 12, 1901.

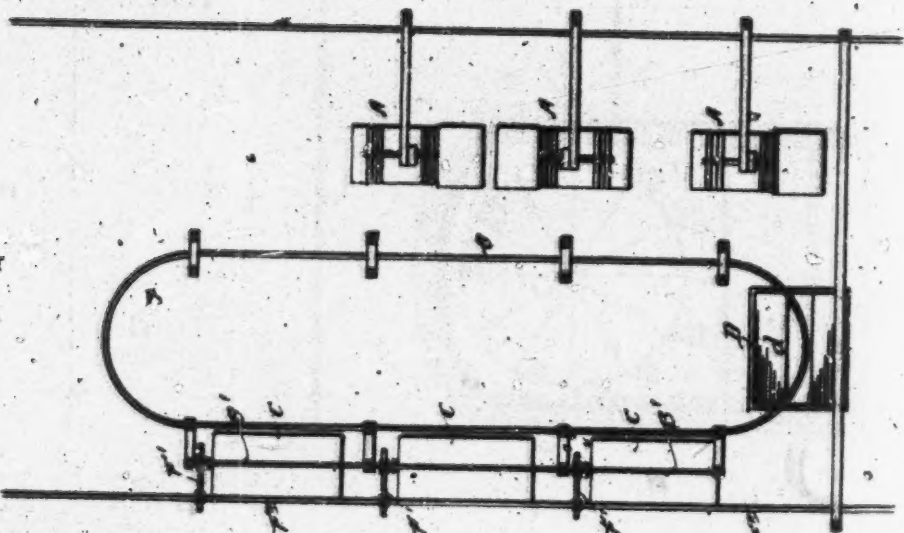
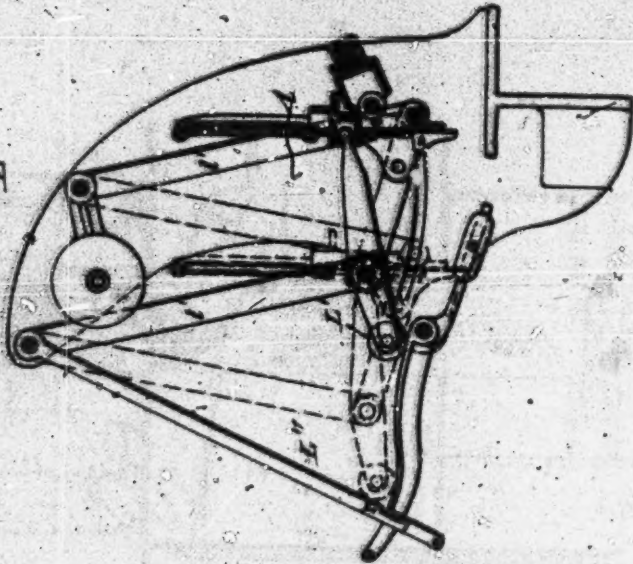
H. D. PERKY.

APPARATUS FOR MANUFACTURING CEREALS INTO FORMS OF FOOD OR BREAD.

(No Model.)

(Application filed Feb. 27, 1900.)

7 Sheets—Sheet 1.



WITNESSES

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Patented Feb. 12, 1901.

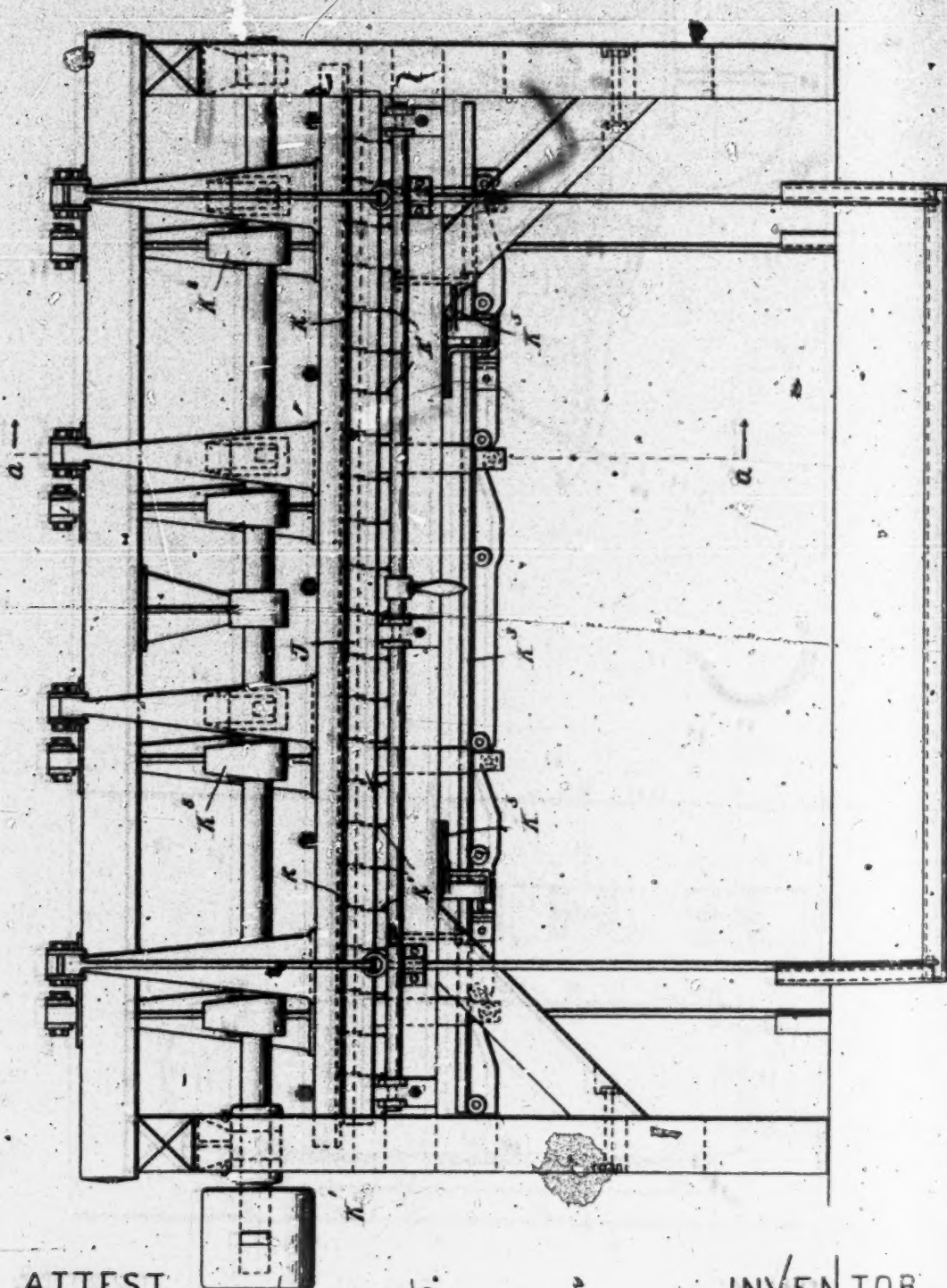
H. D. PERKY.

APPARATUS FOR MANUFACTURING CEREALS INTO FORMS OF FOOD OR BREAD.

(No Model.)

(Application filed Feb. 27, 1900.)

7 Sheets—Sheet 4.



ATTEST.

Harry L. Ames.
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Fig. 5.

INVENTOR.

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By E. H. Anderson.

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Patented Feb. 12, 1901.

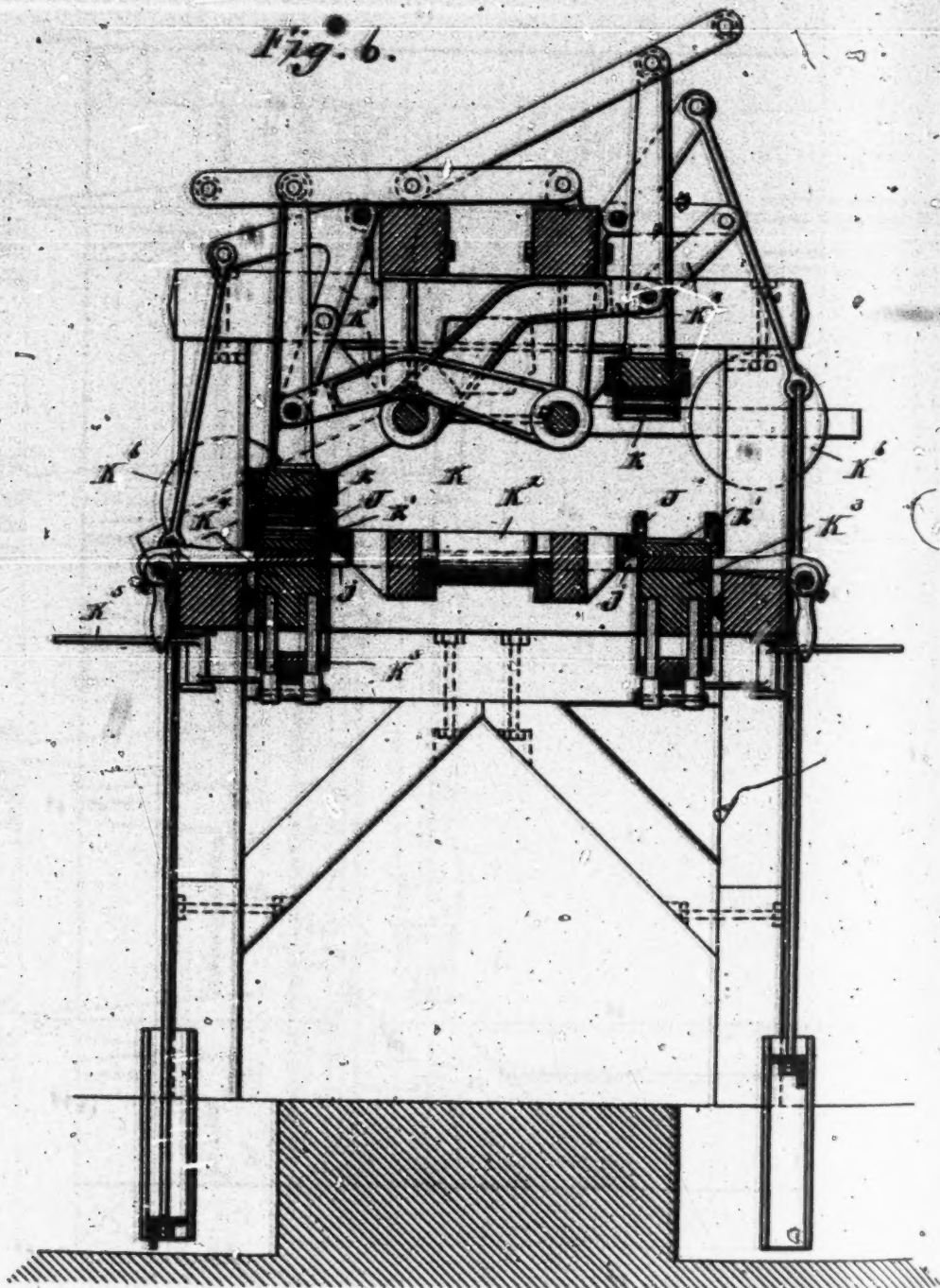
APPARATUS FOR MANUFACTURING CEREALS INTO FORMS OF FOOD OR BREAD.

(No Model.)

(Application filed Feb. 27, 1900.)

7 Sheets—Sheet 5.

Fig. 6.



ATTEST-

Harry L. Ames.
George M. Anderson

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H. O. PERKY.

Patented Feb. 12, 1901.

APPARATUS FOR MANUFACTURING CEREALS INTO FORMS OF FOOD OR BREAD.

(No Model.)

(Application filed Feb. 27, 1899.)

7 Sheets—Sheet 8.

Fig. 8

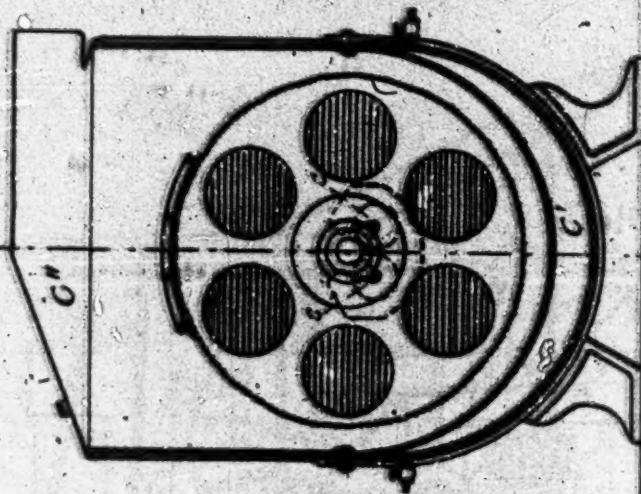
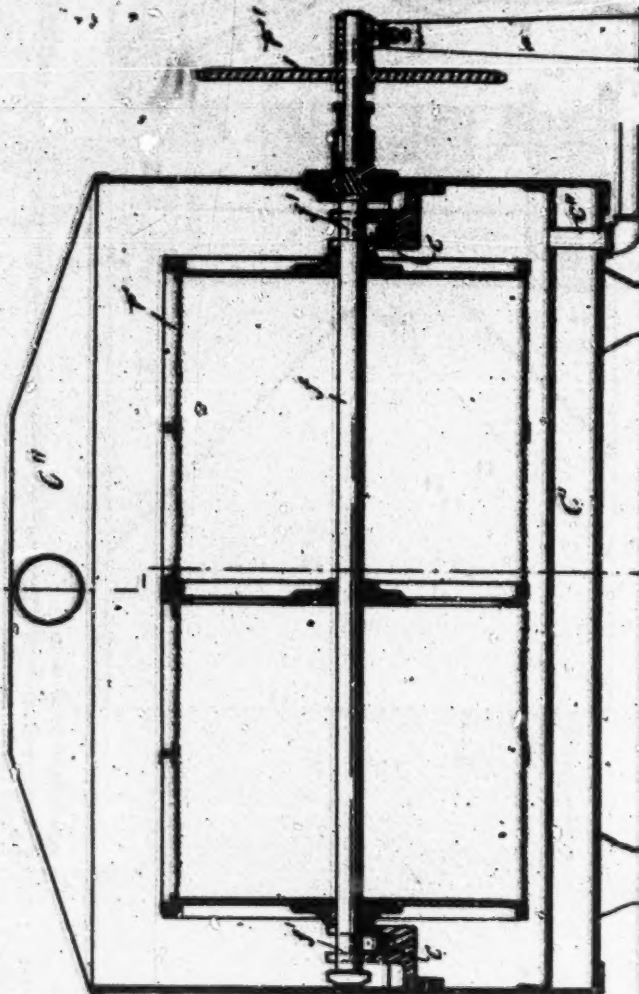


Fig. 7



WITNESSES

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Patented Feb. 12, 1901.

APPARATUS FOR MANUFACTURING CEREALS INTO FORMS OF FOOD OR BREAD.

(No Model.)

(Application filed Feb. 27, 1900.)

7 Sheets—Sheet 7.

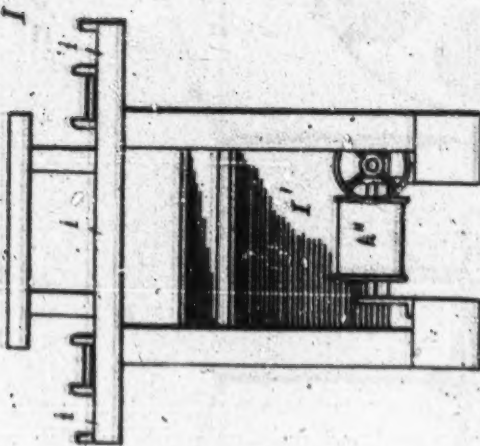


Fig. 10.

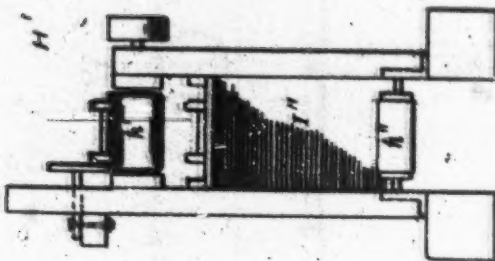


Fig. 9.

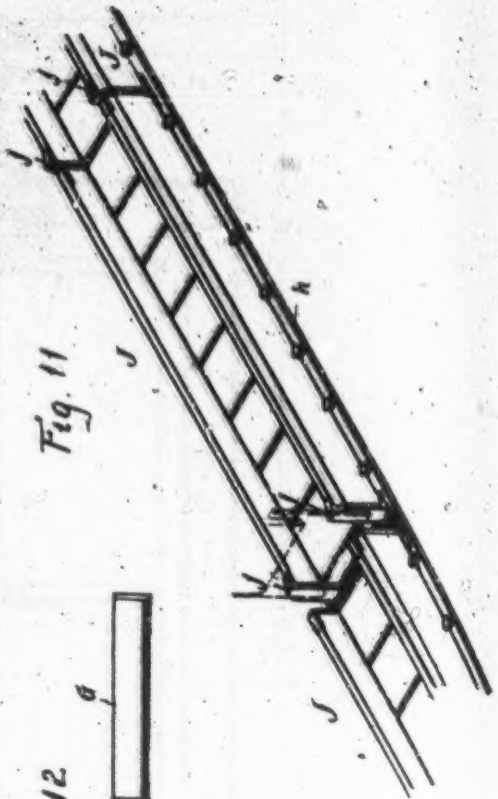


Fig. 11.

Fig. 12.



Fig. 13.

WITNESSES

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MANUFACTURING CEREALS INTO FORMS OF FOOD OR BREAD.

SPECIFICATION forming part of Letters Patent No. 667,892, dated February 12, 1901.

Application filed February 27, 1899. Serial No. 707,085. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful improvements in an Apparatus for the Manufacture of Cereals into Forms of Food or Bread; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

In the accompanying drawings, Figure 1 is a vertical longitudinal section through a building, showing the plant as in operation. Fig. 2 is a vertical transverse section of same. Fig. 3 is a plan view of boilers, cleaners, travelers, &c., on the top floor of a building. Fig. 4 is a sectional view of the section-cutter. Fig. 5 is a side elevation of the gang-cutter table, gang-cutters, and operating mechanism therefor. Fig. 6 is a section on the line *a a*, Fig. 5. Fig. 7 is a section on the line *x x*, Fig. 8. Fig. 8 is a section on the line *y y*, Fig. 7, the cutter upon one side being raised. Fig. 9 is an end elevation of trough-feeding table. Fig. 10 is an end elevation of the panning-table. Fig. 11 is a perspective view of a portion of the belt and sectional receivers thereon, the section-cutter knife being shown in lowered position in dotted lines. Fig. 12 is a detail sectional view of one of the drying-trays. Fig. 13 is a sectional detail view of one of the compartment-receivers.

In Letters Patent No. 548,086, dated October 15, 1895, I have described the process of preparing wheat or similar grain and reducing it to a convenient filamentous or thread-like form for use without taking from the grain any of the beneficial portions which are possessed by the grain in its original state. The present invention has reference to such preparation of the grain in large quantities and its manufacture commercially into food or bread of uniform first quality and at such low rate of manufacture that it will be within the reach of all.

The plant or apparatus is preferably established in a building having several stories for

the more convenient operation of the machines and structures involved in carrying out the process. Upon an upper floor are located the cleaning-machines and boilers, and a drying-flue extends from this floor to a lower floor, where the grain is discharged upon trays for further drying. Upon an intermediate floor are located the reducing-machines in gang form.

In the accompanying drawings the letter A designates a cleaning-machine, which is preferably a pulsatory water-cleaner of the general character set forth in Letters Patent No. 533,821, dated February 5, 1895. Any required number of these machines may be employed, according to the capacity of the plant. The grain of commerce is fed to these machines and when discharged therefrom is clean, being without grit or extraneous matter. An overhead track B of continuous form extends from the cleaners to the boilers C and to the mouth *d* of the drying-flue D. Travelers E, having suspended hooks or catches *e*, are arranged upon the overhead track and serve for the transportation of the wire-cloth cylinders or cages F. The grain discharged from the cleaner is deposited in the cage, which is then closed and fastened and is conveyed by means of the track B to the boiler. Above the series of boilers extends an overhead track B', (see Fig. 3,) having a traveling lift E', Fig. 2, provided with hooks or catches *e'*, said hooks being separated by a distance equal to that between the hooks *e* of the traveler E, this distance being determined by the length of the cage whose shaft *f* the hooks are designed to engage at *f'*. The lift is operated until the weight of the cage and its contents bears upon it, being raised sufficiently for the disengagement of the hooks *e* of the traveler E. The lift is now operated to deposit the cage in the boiler in such manner that its journals rest in the bearing *c* (see Figs. 7 and 8) of the boiler provided therefor. In order to save weight and to avoid grime and smoke, the boilers are heated by steam, the pipes being indicated at *c''*, Fig. 7. The cage is rotated in the boiler by means of suitable gearing, sprocket-wheel and chains being preferred, as indicated at F', in connection with a line-shaft F''. The boilers are provided with steam-

heating chambers C' and with covers C". When the grain is sufficiently cooked and after it has been salted, the cage is lifted out of the boiler and transferred to the traveler E, whereby it is conveyed to the mouth d of the drying-flue D, into which the grain is discharged from the cage. Passing downward through this flue it is diverted from side to side by means of rotary or inclined ledges d' in order to facilitate the action upon the grain of the suction-blast through the flue produced by means of a fan at D'. The grain is discharged from the flue into a compartment-receiver a, (see Fig. 13,) whereof each compartment is designed to hold a sufficient quantity to charge one of the drying-trays G, into which the grain is discharged by opening the movable bottom g of the compartment. The drying-tray, Fig. 12, is provided with a wire-cloth bottom, which is usually overlaid with cotton sheeting. The grain is then spread evenly in the tray, which is conveyed by means of a carrier G" between the lines of racks G"', upon one of which the tray, with its charge of grain, is placed for further drying, or the trays may be loaded into an elevator and placed in racks on the floor above the reducing-machines. In the drawings, however, I have shown grain-elevators g', which discharge into the hoppers b of the reducing-machines, each hopper having preferably several branches b', in order that it may feed several heads of the machine.

The reducing-machine H is of gang form, its roller-heads K being arranged in series. These roller-heads are of the general character indicated in Letters Patent No. 532,698, dated January 16, 1895, and in Letters Patent No. 533,555, dated February 5, 1895. The grain fed into the hoppers of the roller-heads is reduced by their grooved rollers to shred or thread like form, each head depositing a layer of the shred-like threads upon the traveling receiver J. As these layers are deposited in succession, the thickness of the product upon the receiver is gradually increased to the extent desired, in accordance with the number of roller-heads constituting the machine or such proportion of them as may be in gear. In order to form biscuit of fair size, I desire to use some thirty-odd heads in the gang.

Below the series of reducing-heads extends the traveling sectional receiver J, (see Fig. 11,) which is carried by the endless belt h, running upon a bed of rollers and over suitable end pulleys, one of which is geared to drive the belt. At one end of the gang-machine is the trough-feeding table H', (see Figs. 1 and 9,) having an endless traveling belt h', which moves at a speed a little faster than that of the main receiver-belt h. At the other end of the machine is the gang-cutter table K', Figs. 1, 5, and 6, which is usually provided with two gang-cutters, (see Fig. 6,) one on each side, and between said cutters with a roller-bed K² to receive the troughs as they

come loaded with the product from the gang reducing-machine. The trough-feed belt is gaged to be exactly in line with the main receiver-belt and on the same level therewith, as also is the roller-bed K² of the cutter-table. Beyond the cutter-table and in line therewith is the panning-table I, Figs. 1 and 10, having slideways i, the surfaces of which are level with that of the visers K³ of the gang-cutters.

Below the receiver-belt h is the traveling trough-returning belt h², which is designed to extend from a pulley under the panning-table I to a pulley under the trough-feeding table H'. This belt h² is supported on suitable rollers, and above it, at its ends, are provided the oppositely-inclined chutes I' and I". The main receiver-belt h and trough-return belt h² are usually provided with guide-stands along their edges to keep the troughs in line.

The sectional receiver comprises a number of open-ended troughs J, the bottoms of which are transversely slotted, as indicated in Letters Patent No. 532,186, dated January 8, 1895. The slots are made at equal distance from each other, this distance being that of the width of the biscuit desired. The ends of the troughs are shod with iron to prevent undue wear and to preserve exactness in their length. At the front end of each trough the iron shoe or end piece is provided with a catch lug or projection j.

At the delivery end of the gang reducing-machine is located the automatic section-cutter L, actuated by the moving troughs J to divide the reduced product between the troughs and which is provided with a parallel-motion knife-frame l, suspended to swinging arms l', and with a lateral projection to engage the catch-lug j of the trough J. The spring-retracted knife is moved downward by means of the cam L', which engages the knife-lever as the knife moves forward. An automatic trip is provided at L² to release the cam-lever and allow it to fall to prevent the action of the retracting-spring and the return of the knife.

The troughs J returned to the trough-feeder are pushed upward from the return-belt h² along the inclined chute I', from which they are fed to the belt h', which carries them to the main receiver-belt h, automatically closing each trough against the trough which precedes it, and thereby securing close joints between the sections or troughs on the main receiver-belt. In their passage below the reducing-heads the troughs are loaded with the filamentous layers of the grain product. As each trough is discharged from the gang reducing-machine, its load is separated from that of the next trough or section by means of the automatic cutter L. The loaded troughs discharged upon the gang-cutter table K' are slid laterally in position upon the risers K³ of the lower gang or set k of knives. (See Figs. 5 and 6.) The risers K³, secured to a frame K⁴, are then lowered by means of a lever mechanism K⁵, letting the trough down

upon the lower set *k* of knives. The upper set or gang *k* of knives is designed to have vertical motion, its frame being provided with guides. This gang of knives is brought downward by means of lever mechanism *K*¹ to divide the load of the product in the trough into biscuit forma. This gang of knives being raised by means of a spring *K*² or weight, or both, the risers are elevated to raise the trough to a level with the slideways of the panning-table, to which the trough, with its load, is quickly transferred by endwise movement. The panning-table is provided with a pan-shelf *i*, preferably above the level of the slideways or ledges *i*, to receive the pans *m*, into which the biscuit are transferred from the troughs by the panners. The empty troughs from the panning-table are transferred by means of the inclined chute *P*² to the trough-return belt, whereby they are returned to the feeding-table. The pans of biscuit are loaded upon carriers, whereby they are transferred to the oven-room *X*, Fig. 2, and they are then placed upon revolving shelves *X'* in the oven, wherein they remain until sufficiently browned. When taken from the oven, the interior of the biscuit is still quite soft and moist, and in order to fit them for commercial use they are placed upon racks of carriers and passed through a hot-air chamber *Z*.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

3. In apparatus for the purpose described, the combination of the grain-cages, the aligned grain-cleaners, the aligned boilers adapted for the reception of said cages, the drying-chute, a track leading from said cleaners to said boilers, and to said chute, means for transferring said cages from said cleaners to said boilers and from said boilers to said chute upon said track, and means for transferring said cages from said track into said boilers, and from said boilers back again to said track, substantially as specified.

4. In apparatus for the purpose described, the combination of the grain-cages, the aligned grain-cleaners, the aligned boilers adapted for the reception of said cages, a track leading from said cleaners to said boilers, means for transferring said cages from said cleaners to said boilers upon said track, means for transferring said cages from said track, into said boilers, and from said boilers back again to said track, and means for rotating said cages in said boilers, substantially as specified.

5. In apparatus for the purpose described, the combination of the grain-cages, the aligned grain-cleaners, the aligned boilers adapted for the reception of said cages, the drying-chute, a track leading from said cleaners to said boilers and to said chute, means for transferring said cages from said cleaners to said boilers, and from said boilers to said chute upon said track, means for transferring said cages from said track into said boilers and from

said boilers back again to said track, a traveling receiver under said chute, having a movable bottom, drying-trays, and a carriage for said trays arranged beneath said receiver, substantially as specified.

6. In apparatus for the purpose described, the combination of the drying-chute, a traveling compartment-receiver beneath said chute, movable bottoms for said compartments, drying-trays, and a carriage for said trays arranged beneath said receiver, substantially as specified.

7. In apparatus for the purpose described, the combination of the grain-drying chute, a traveling receiver under said chute, and having a movable bottom, drying-trays, a carriage for said trays arranged under said receiver, an elevator for the grain, and reducing-machines fed by said elevator, substantially as specified.

8. In apparatus for the purpose described, the combination of a grain-elevator, grain-reducing machines, a hopper into which the grain is discharged from said elevator, and a plurality of spouts leading from said hopper and feeding said reducing-machines, substantially as specified.

9. In apparatus for the purpose described, the grain-reducing machines, means for discharging the reduced product from said machines, a traveling belt beneath said machines, receiving-troughs carried by said belt, the trough-feeding belt, and means for moving said trough-feeding belt a little faster than said first-named belt, substantially as specified.

10. In apparatus for the purpose described, the grain-reducing machines, means for discharging the reduced product from said machines, a traveling belt beneath said machines, receiving-troughs carried by said belt, and a section-cutter operated by said troughs to divide the reduced product contained thereby between the troughs, substantially as specified.

11. In apparatus for the purpose described, the grain-reducing machines, means for discharging the reduced product from said machines, a traveling belt beneath said machines, receiving-troughs carried by said belt, a section-cutter operated by said troughs to divide the reduced product contained thereby between said troughs, and means for returning said cutter to raised position, substantially as specified.

12. In apparatus for the purpose described, the grain-reducing machines, means for discharging the reduced product from said machines, a traveling belt beneath said machines, receiving-troughs carried by said belt, a section-cutter operated to divide the reduced product contained by said troughs between said troughs, and a gang-cutter operated to divide the reduced product contained by each said trough into blocks, substantially as specified.

13. In apparatus for the purpose described,

the grain-reducing machines, means for discharging the reduced product from said machines, a traveling belt beneath said machines, receiving troughs carried by said belt, and having transverse slots therein, a section-cutter operated to divide the reduced product contained by said troughs between said troughs, and a gang-cutter having knives operating in the transverse slots of said troughs to divide the reduced product of each trough into blocks, substantially as specified.

12. In apparatus for the purpose described, the grain-reducing machines, means for discharging the reduced product from said machines, a traveling belt beneath said machines, receiving troughs carried by said belt, and having transverse slots therein, a section-cutter operated by said troughs to divide the product contained thereby between the troughs, and a gang-cutter having knives operating in the transverse slots of said troughs to divide the reduced product of each trough into blocks, substantially as specified.

13. In apparatus for the purpose described, the grain-reducing machines, means for discharging the reduced product from said machines, a traveling belt beneath said machines, receiving troughs carried by said belt, means for dividing the reduced product contained by said troughs between the troughs, means for dividing the reduced product of each trough into blocks, and a panning-table in line with said reducing-machines, substantially as specified.

14. In apparatus for the purpose described, the grain-reducing machines, means for discharging the reduced product from said machines, a traveling belt beneath said machines, receiving troughs carried by said belt, a trough-feeding belt arranged to move a little faster than said first-named belt, means for dividing the reduced product contained by said troughs between the troughs, and means for dividing the reduced product of each trough into blocks, substantially as specified.

15. In apparatus for the purpose described, the grain-reducing machines, means for discharging the reduced product from said machines, a traveling belt beneath said machines, receiving troughs carried by said belt, a trough-feeding table having a belt arranged to move a little faster than said first-named belt, means for dividing the reduced product contained by said troughs between the troughs, means for dividing the reduced product of each trough into blocks, a panning-table in line with said reducing-machines, a trough-return belt extending underneath said panning-table forwardly under said reducing-machines and trough-feeding table, a chute

leading downwardly from said panning-table to said return-belt, and a chute leading upwardly from said return-belt, to said trough-feeding belt, substantially as specified.

16. The combination with the gang reducing-machines, the sectional, transversely-slotted receivers, and the carrying mechanism for said receivers, of the gang-cutter table having a central roller-way to receive said receivers, and lateral gang-cutters having upper and lower knives, vertically-movable risers adapted to support said receivers thereon, together with suitable mechanisms for actuating the upper knives, and the said risers, substantially as specified.

17. The cutting-table having a central roller-way, and lateral gang cutting mechanisms upon each side thereof, said gang cutting mechanism having vertically-movable risers adapted to support the material being cut, means for actuating the said risers, an upper, vertically-movable gang of knives, and a lower stationary gang, together with suitable mechanism for actuating the upper knives, substantially as specified.

18. The combination with the gang reducing-machines having the roller-heads, the endless feed-belt which travels beneath the said heads, the feed-table at the front of the gang-machine, its feed-belt adapted to be rotated at a slightly-greater rate of speed than the feed-belt of the gang-machines, the sectional, slotted receivers, the section-cutter, the gang-cutters, the panning-table, the endless return-belt, extending from the feed-table to the panning-table, and the inclined chutes, leading from each of said tables to the said return-belt, substantially as specified.

19. The combination with the gang reducing-machines, the endless feed-belt, and the sectional receivers adapted to be carried by the said belt, of the automatic section-cutter, and the gang-cutters, substantially as specified.

20. The combination with the gang reducing-machines, the endless feed-belt, and the sectional receivers adapted to be carried by said belt, and having transversely-slotted bottoms, of the two gang-cutters, having upper and lower sets of knives with actuating mechanisms therefor, and a roller-way between said cutters, and adapted to receive said receivers, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

J. G. POMERENE,
B. E. SUTTON.

No. 678,127.

H. D. PERKY.

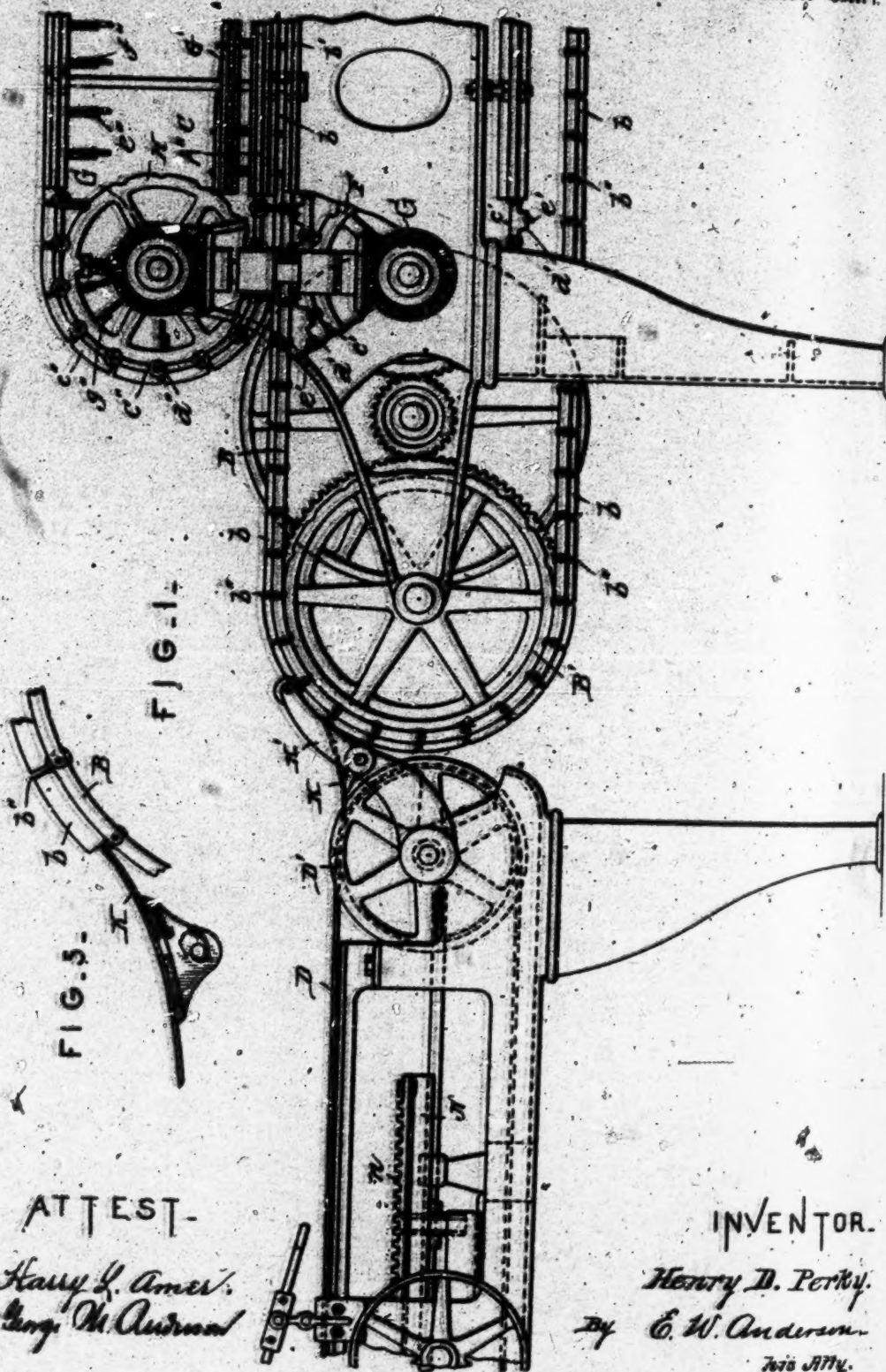
Patented July 9, 1901.

MACHINE FOR REDUCING FOOD MATERIAL TO FINE AND DISTRIBUTING SAME.

(No Model.)

(Application filed Nov. 20, 1900.)

4 Sheets—Sheet 1.



ATTEST.

Harry L. Ames.
 Atty. in Genl.

INVENTOR.

Henry D. Perky.

By E. W. Anderson.

July 1901.

No. 678,127.

H. D. PERKY.

Patented July 9, 1901.

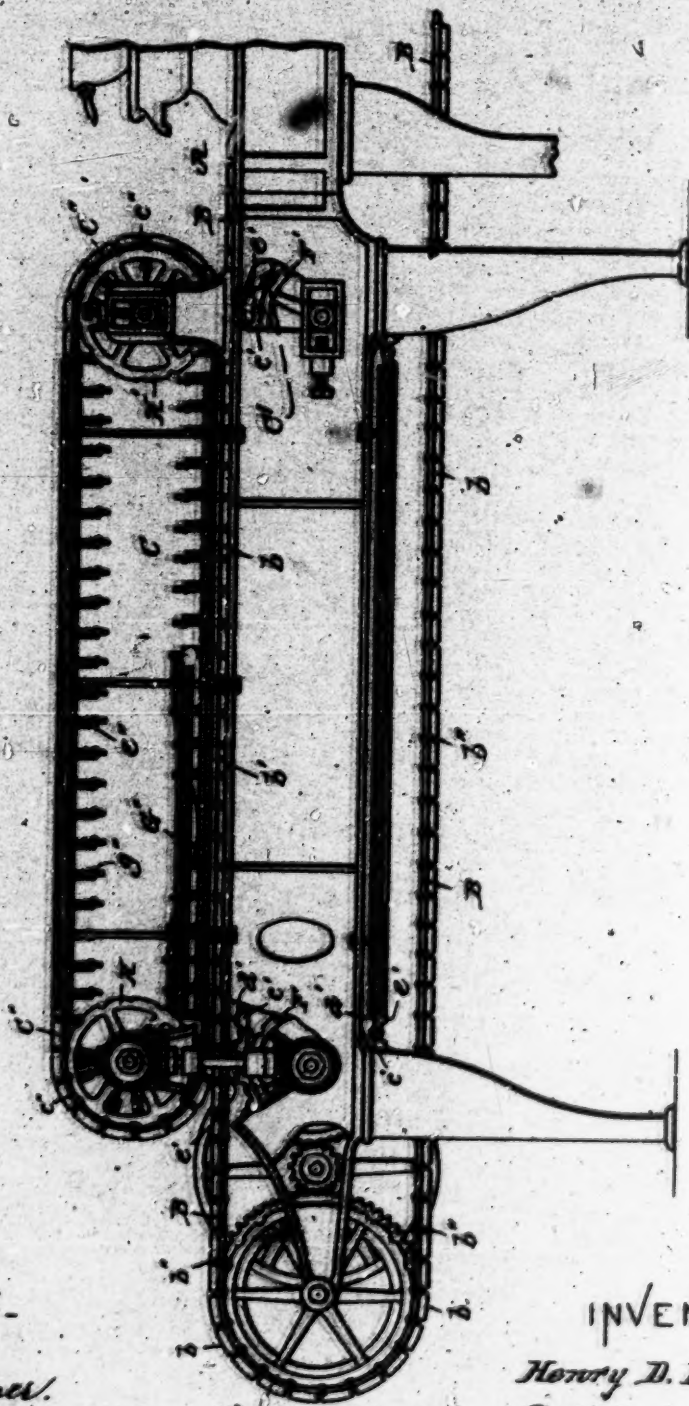
MACHINE FOR REDUCING FOOD MATERIAL TO FINE AND DISTRIBUTING SAME.

(No Model.)

(Application filed Nov. 20, 1900.)

4 Sheets—Sheet 2.

FIG. 2.



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H. S.

No. 578,127.

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Patented July 3, 1901.

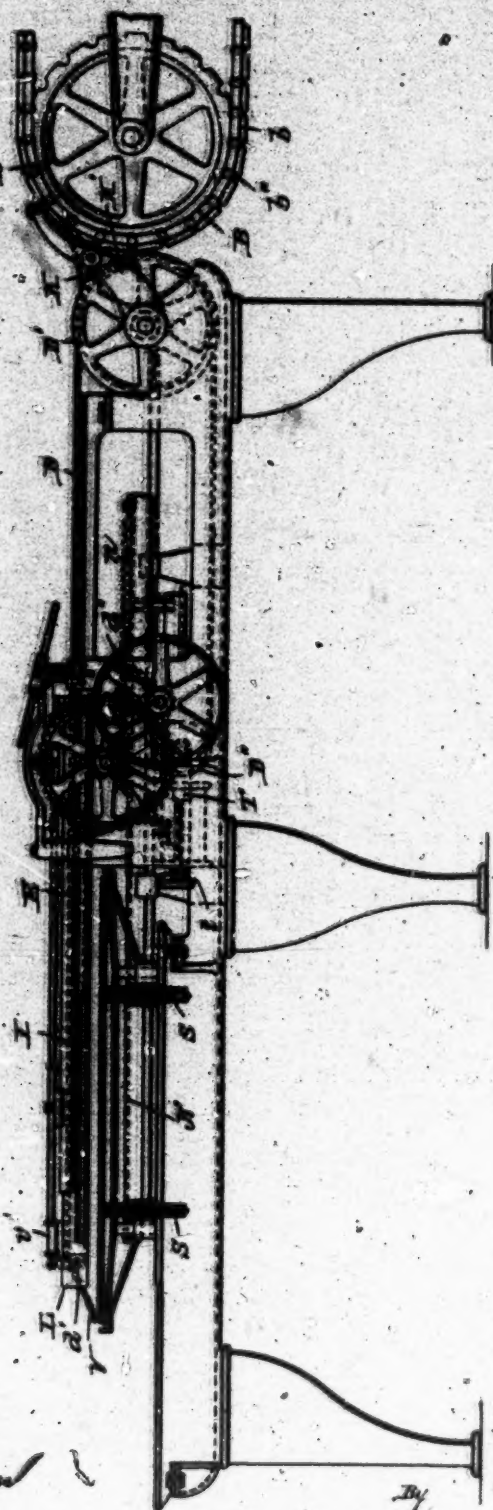
MACHINE FOR REDUCING FOOD MATERIAL TO FORM AND DISTRIBUTING SAME.

(No Model.)

(Application filed Nov. 25, 1900.)

4 Sheets—Sheet 3.

FIG. 3.



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Patented July 9, 1901.

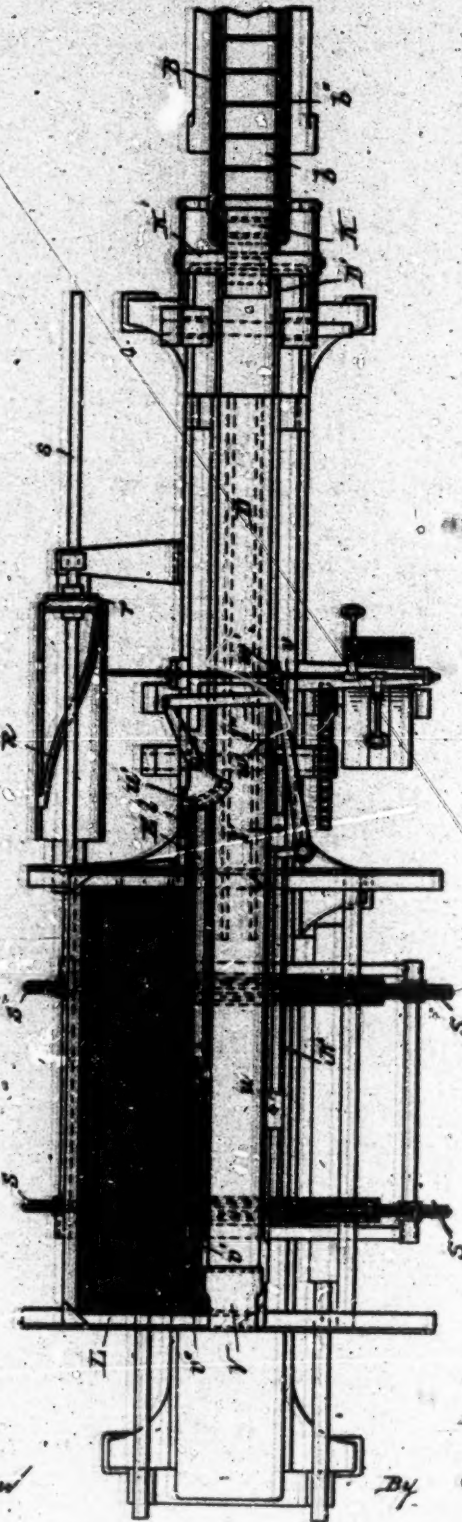
MACHINE FOR REDUCING FOOD MATERIAL TO FORM AND DISTRIBUTING SAME.

(No Model.)

(Application filed Nov. 20, 1900.)

4 Sheets—Sheet 4.

FIG. 4.



ATTEST.

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George W. Anderson

INVENTOR.

Henry D. Perky,
E. W. Anderson -
his Atty.

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF WORCESTER, MASSACHUSETTS.

MACHINE FOR REDUCING FOOD MATERIAL TO FORM AND DISTRIBUTING SAME.

SPECIFICATION forming part of Letters Patent No. 678,127, dated July 9, 1901.

Application filed November 20, 1900. Serial No. 37,163. (No model.)

all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful improvements in Machines for Reducing Food Material to Form and Distributing Same; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In the accompanying drawings, Figure 1 is a side elevation of the abutting end portions of the cutting and panning mechanisms. Fig. 2 is a side elevation of the cutting mechanism, the reducing mechanism being indicated. Fig. 3 is a side elevation of the panning mechanism in conjunction with the belt-trough B. Fig. 4 is a plan view of the same. Fig. 5 shows the bridge-slide K in section in conjunction with the belt-trough.

This invention has relation to machines for reducing food material in large quantities fed continuously in regularly-subdivided form and placing the same upon receivers for baking or drying or such other subsequent procedure as may be required.

The invention consists, mainly, in means for continuously subdividing and depositing the material in parallel rows upon receivers. In the accompanying drawings the letter A designates that portion of a mechanism whereby the material—such, for instance, as wheat—is reduced to shred or thread-like form and deposited upon a sectional traveling trough or receiver continuously and in sufficient quantity for the thickness of the biscuits or subdivisions which are to be formed.

B indicates the sectional belt-trough of this placing-machine, which passes through and forms a part of the subdividing machinery, which, being provided with upper and lower traveling knife-belts moving at the same rate of speed as the belt-trough, serves to subdivide the continuously-moving ribbon of material into biscuit-sections. The subdivided material upon the belt-trough, passing beyond the cutting mechanism, is taken from the belt-trough by an inclined bridge-slide, which discharges the biscuit-sections in order upon the depositing-belt D, whereby,

in connection with the moving receiving mechanism E, carrying the receivers or pans, the biscuit-sections are placed regularly and in order thereon. I have illustrated in this connection grooved-roll reducing-machines adapted to discharge the wheat or other material in thread-like form, as indicated in Letters Patent No. 533,555, dated February 5, 1895; but it is apparent that other machines adapted to deposit the food material in ribbon form upon the sectional traveling belt-trough B may be employed. This belt-trough consists of sections *b*, each of which is of proper size to hold one biscuit, and these sections form links of the belt, being connected by lateral lugs and pivots in such manner as to leave the interval between the sections clear for the passage of the knives of the cutting mechanism.

B' indicates one of the end pulleys of the belt-trough, and *b'* represents the lateral ways of the frame, upon which the lugs of the belt-sections move, these lugs being usually provided with small rollers.

The lower traveling cutter or knife belt C' consists of sections *c'*, each of which carries a blade *e'*, said sections having each a rise *d'*, adapted to fit a recess *b''* between belt-sections *b*, as the belts come together in such manner that the blade *e'* is passed upward through the narrow interval or slot between the trough-sections, the two belts moving along continuously at the same speed. F and F' indicate the pulleys of this belt. The upper traveling cutter or knife belt C'', also moving at the same speed, consists of sections *c''*, linked together by means of lugs carrying rollers, as at *d''*, and is usually recessed in its lower face or otherwise shaped to give form to the biscuit or to compress the material where the cut is to be made. The blade *e''* of this section is movable up and down, being carried in a slideway *f''* formed upon the back of the section and having a friction-spring, and small lateral rollers *g''* are provided upon lugs of the blade-frame, adapted to engage a camway *G* of the main frame, which serves to depress the blades of the sections sufficiently to make them cooperate with the blades of the lower knife-belt in cutting the ribbon of material transversely into sections. H and H' indicate the pulleys of this

knife-belt, and G represents gearing whereby the knife-belts are caused to travel at the same rate of speed as the belt-trough. A" indicates guideways of the rollers d".

Resting upon the belt-trough B at its end where it commences to pass downward around the end pulley B' is a bridge-slide K of about the width of the interval between the side flanges of the trough-section. This bridge-slide is connected to a frame K', which is usually pivoted to the main frame. The bridge-slide is arranged in ways of the frame K', which is provided with a spring designed to hold the slide in projected position, but with a yielding pressure. The face of the bridge-slide is usually formed with a concave curvature longitudinally, and the slide is arranged in a downwardly-inclined position to pass the biscuit-sections to the depositing-belt D, which is arranged at a lower level than that of the belt-trough and is geared to run at the same rate of speed continuously, so that the biscuit-sections are taken from the belt-trough as fast as they are formed and delivered thereby. While the receiving end portion of this belt D moves along continuously and steadily in position with the biscuit-sections, which are received thereon from the bridge-slide, the depositing end portion of the belt shortens and lengthens alternately, by the one movement depositing the biscuit-sections upon the receiver or pan and by the other movement carrying forward the line or feed of biscuit-sections to be deposited in a second row upon the receiver or pan parallel to the first row, the lateral adjustment and longitudinal retraction of the receiver or pan taking place while the depositing-belt is lengthening itself.

The reciprocating receiver frame or carriage N for the pans is geared to move at the same rate of speed as the depositing-belt and the belt-trough.

D' indicates the end pulley of the belt D, which is journaled in fixed bearings of the main frame, which is provided with slideways l for a carriage L, which carries at its delivering end the small end pulley d' of the belt, said belt in its return below passing around a pulley d" in bearings of the carriage L and around another pulley D", which is seated in bearings of an adjustable holding-piece T, which is connected to the main frame by means of an adjusting-screw i. The belt D therefore has an upper end branch upon which biscuit-sections are carried and by which they are deposited and a lower branch which acts as a take-up when the upper branch is shortened as the carriage moves backward.

M indicates a reversing-shaft having rack-and-gear engagement with the slide frames or carriages L and N, whereby said carriages are reciprocated in opposite directions, but at the same rate of speed. The carriage N, having the lower rack n, carries the pulleys of the sprocket-chains S, upon which the receivers

or pans are placed in position to receive the biscuit-sections from the depositing-belt. These sprocket-chains run transversely and serve to convey the proper intermittent movement to the receivers in the lateral direction, said movement being effected by means of a cam R intermittently engaging the pawls of the shaft s.

At the end of the carriage L is pivoted a depositing lip or slide V, which takes the biscuit-sections from the end of the depositing-belt D and passes them down its incline to the receiver or pan. By means of reversing-gear (indicated at v) this depositing-lip is raised at the end of the movement of discharge and held in the raised position until the extended belt D is in position to place another row of biscuit-sections on the pan, when said lip is lowered promptly to inclined position. The degree of inclination is readily adjustable while the machine is in motion by means of the sleeve-screw v', the operation of which changes the position of the worm v".

The reversing devices are operated automatically by the carriage L through its cam-lugs l and l', which alternately engage the switch-lever l". By means of the slides u and u', which carry said cam-lugs, and the adjusting-screw mechanism (indicated at w and at w') the position of either or both of the cam-lugs can be changed. In this manner means are provided for lengthening or shortening the stroke of the carriages L and N at either or both ends of the movement.

The material carried by the belt-trough between the knife-belts is subdivided thereby, the blades of the lower knife-belt passing upward through the intervals between the trough-sections, which are held in position by their guideways, and the blades of the upper knife-belt being depressed by means of the camways, which engage the rollers of the blade-frames. The upward push of the lower blade and the downward action of the compressing edge of the upper knife-section render the action of the upper knife clean and effectual and at the same time obviate any tendency of the material to adhere in the slot between the trough-sections. The biscuit-sections thus formed are taken from the belt-trough by the bridge-slide, which may have a short reciprocating motion, and passed to the depositing-belt, which, with the aid of its depositing-lip, places them upon the receiver or pan, which by an intermittent lateral movement effects an arrangement of the biscuit-sections in parallel rows. As one receiver or pan is filled another is placed upon the carriage to be filled in turn. Usually the carriage N is made wide enough to hold two or more pans side by side in order to give the attendant sufficient time to remove a filled pan and place an empty one upon the sprocket-belts while an intermediate pan is being filled.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with reducing mechanism, and panning mechanism, of upper and lower traveling knife-belts, a belt-trough whereby the material from the reducing mechanism is elongated or ribbon form, and carry-
ing the same between the knife-belts whereby
it is subdivided, and a bridge-slide or transfer
device whereby the subdivisions or sections
of the material are taken from the trough-belt,
and placed upon the belt of the panning mechanism, substantially as specified.

2. The combination with upper and lower traveling knife-belts, and with panning mechanism running at the same rate of speed as the knife-belts, of a sectional belt-trough,

adapted to carry the material deposited thereon in elongated or ribbon-like form, and passing between the knife-belts at the same rate of speed, and a bridge-slide or transfer device whereby the subdivisions or sections of the material are taken from the trough-belt and placed upon the belt of the panning mechanism, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKINS

Witnesses:

J. R. GILKESON,

ALBERT H. CHAFFEE.

No. 678,225.

Patented July 16, 1901.

H. D. PERKY.

PNEUMATIC PANNING OR DISTRIBUTING MACHINE.

(Application filed Sept. 20, 1900.)

5 Sheets--Sheet 1

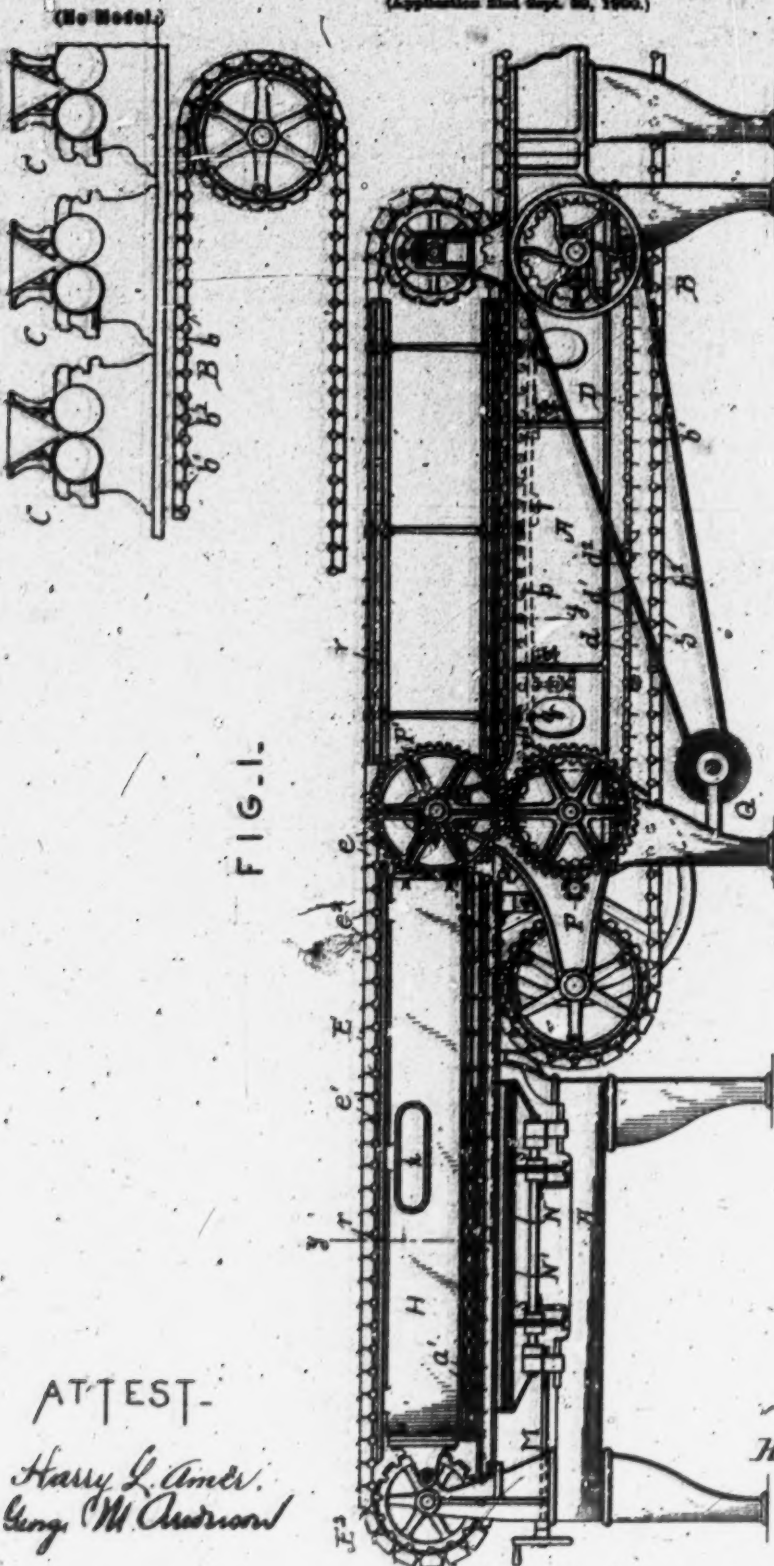


FIG. 1.

ATTEST-

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Geny. M. Anderson

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Henry D. Perky
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his Ally

No. 678,625.

Patented July 16, 1901.

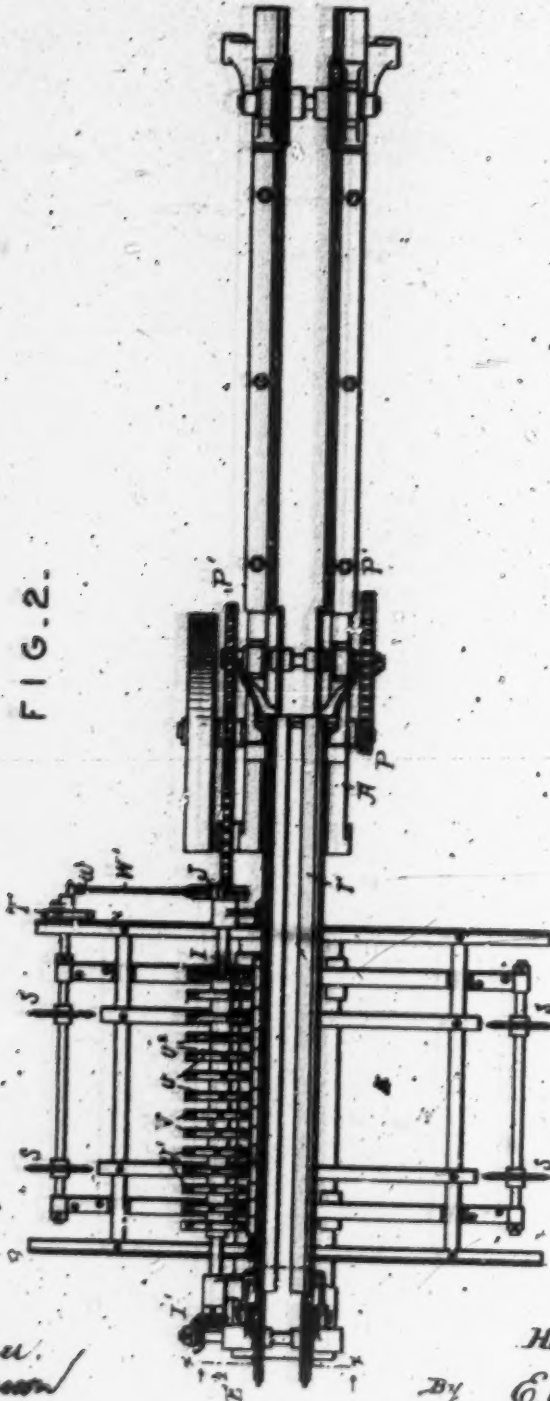
H. D. PERKY.

PNEUMATIC PANNING OR DISTRIBUTING MACHINE.

(No Model.)

⁶(Application filed Sept. 29, 1900.)

5 Sheets—Sheet 2.



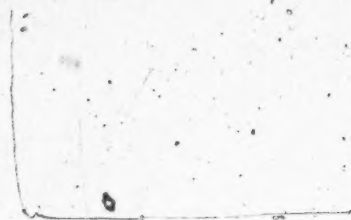
ATTEST.

Harry L. Amer.
Gerrit M. Anderson

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No. 678,625.

H. D. PERKY.

Patented July 16, 1901.

PNEUMATIC PANNING OR DISTRIBUTING MACHINE.

(No Model.)

(Application filed Sept. 20, 1900.)

5 Sheets—Sheet 3.

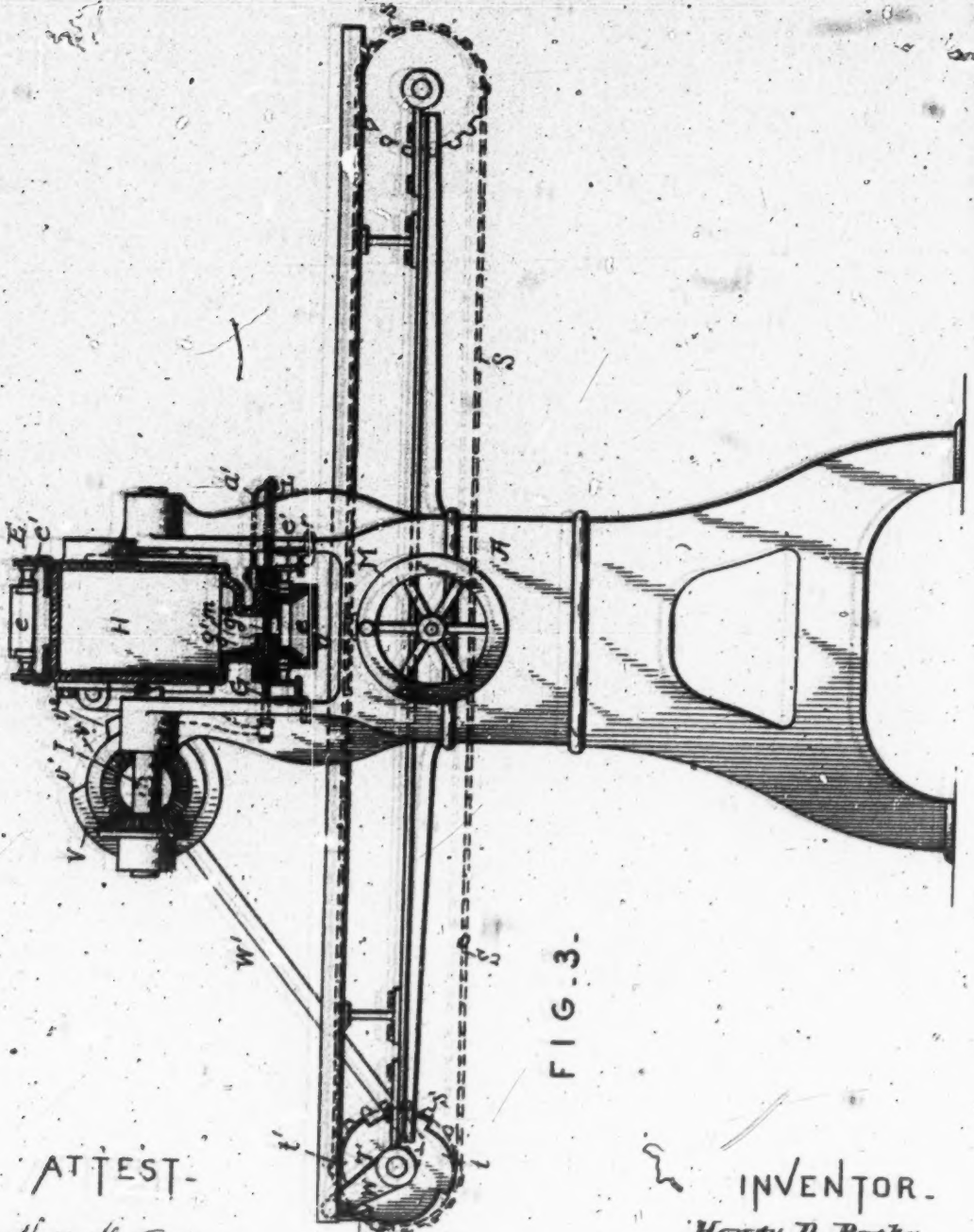


FIG. 3.

ATTEST.

Harry L. Amer.
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INVENTOR.

Henry D. Perky.

By *E. W. Anderson* -
his Atty.

No. 678,625.

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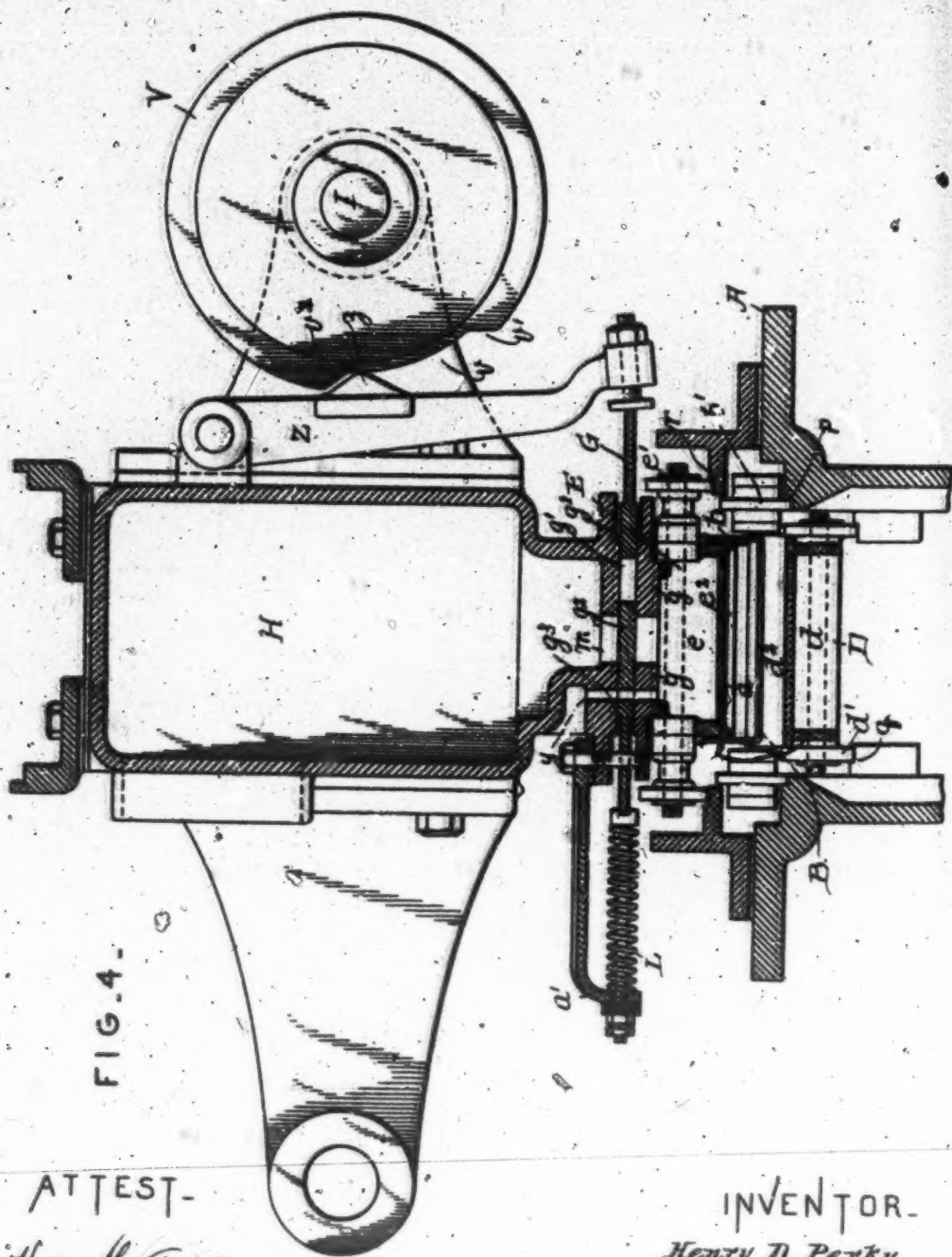
Patented July 16, 1901.

PNEUMATIC PANNING OR DISTRIBUTING MACHINE.

(No Model.)

(Application filed Sept. 30, 1900.)

5 Sheets—Sheet 4.



ATTEST-

Harry L. Amer.
Gerrit M. Anderson

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his ATTY.

No. 678,625.

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Patented July 16, 1901.

PNEUMATIC PANNING OR DISTRIBUTING MACHINE.

(No Model.)

(Application filed Sept. 20, 1900.)

5 Sheets—Sheet 5.

FIG. 5.

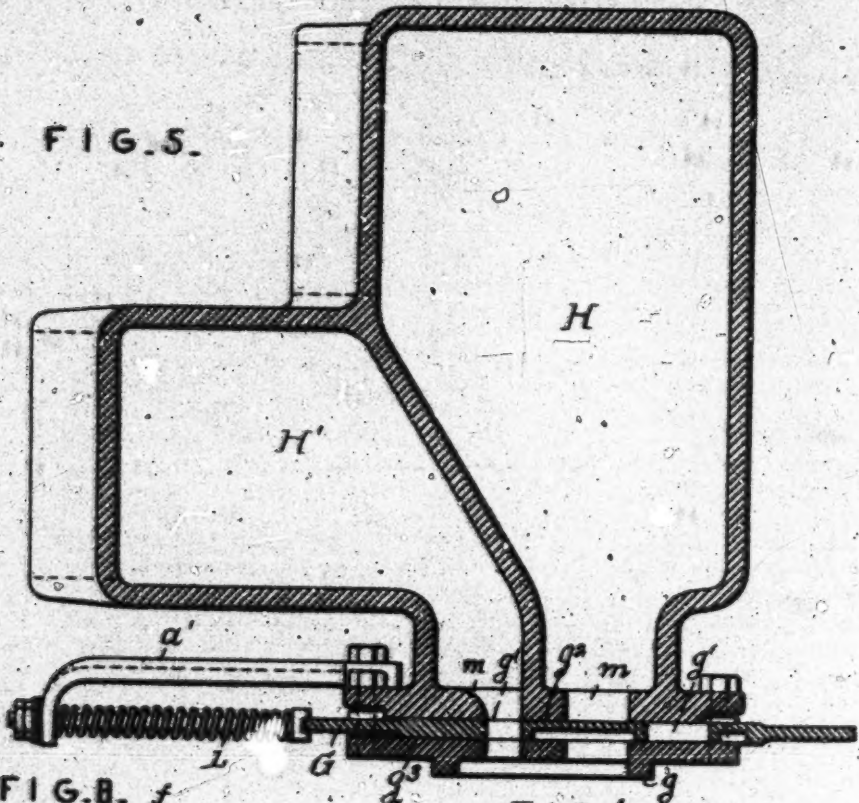


FIG. 7.



FIG. 10.

FIG. 11.

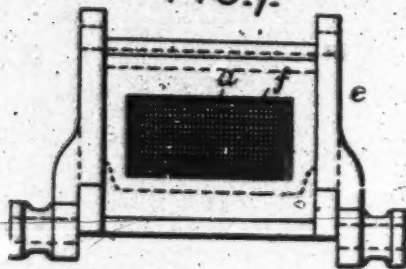
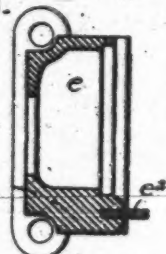
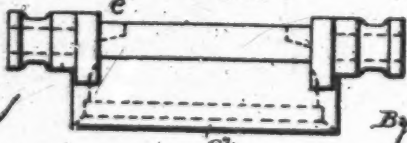


FIG. 9.

ATTEST.

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INVENTOR.

Henry B. Perky.

By E. W. Anderson -
his Atty.

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF WORCESTER, MASSACHUSETTS.

PNEUMATIC PANNING OR DISTRIBUTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 678,625, dated July 16, 1901.

Application filed September 29, 1900. Serial No. 31,554. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have made certain new and useful Improvements in Pneumatic Panning or Distributing Machines; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

In the accompanying drawings, Figure 1 is a side elevation of my invention, partly broken away. Fig. 2 is a plan view of the main portion of the machine, the feeding or carrier chain and divider-chains being omitted. Fig. 3 is a section on the line *x x*, Fig. 2. Fig. 4 is a section on the line *y y*, Fig. 1, showing a small opening *y* from the suction-chain to the atmosphere. Fig. 5 is a view similar to Fig. 4, showing two pneumatic chambers *H* and *H'*. Fig. 6 is a plan view of the valve-plate. Figs. 7, 8, 9, 10, and 11 are detail views of one of the upper divider or section links *e*.

The invention relates to the preparation of articles of food, and particularly to the formation and distribution of crackers, biscuits, &c., in regular order, as in panning the same for baking, the object being not only to facilitate the preparation of food in large quantities, but also to promote its sanitary character by avoiding all handling.

The invention consists in providing a pneumatic transfer in combination with a carrier, in the novel construction and combinations of parts constituting a pneumatic transfer or distributor, in the novel construction and combinations of parts constituting a continuously-acting cutting and panning machine wherein the transfer is made by a pneumatic device, and finally in the novel construction and combinations of devices for the purposes set forth, all as hereinafter more particularly described.

In the accompanying drawings, the letter *A* designates framework of substantial character and preferably of iron.

B represents an endless feeding belt or carrier, consisting of short sectional plates or

troughs *b*, on which the ribbon of food material is conveyed, being usually fed thereto by a series of reducing-machines (indicated at 55 *C C C*) or in any other desirable manner.

When reducing-machines such as are indicated in the drawings are employed, it is designed that the ribbon or continuous layer of material shall be formed by shredding the 60 grain, as described in patents which I have heretofore obtained. In such a combination, therefore, it is intended that the grain shall not be touched by hand from the time it is grown in the field until after it is cooked and 65 ready for use as food.

The short sectional plates or troughs *b* of the endless carrier *B* are provided with rollers *b' b'* in order that they shall travel freely on the ways or tracks *p*, provided in the framing. Between the sectional plates or troughs 70 *b b* is a narrow interval of separation *b'* for the passage of devices which serve to divide the ribbon of food material into sections.

D represents the lower endless divider or 75 cutter chain, which consists of a belt of links *d*, having rollers *d'*, which serve to facilitate their movement on the ways or tracks *q* of the framing, these ways or tracks having a slight arch or rise at *q'*, whereby an upward 80 movement of the cutter-links *d* is gradually effected in order to cause the separator-blades *d''* of said links to pass upward through the intervals of separation *b'* of the feeding belt or carrier *B*. Each link *d* is provided with a 85 blade *d''*, which is transversely arranged in the link-body and secured thereto either rigidly or adjustably, as may be found desirable.

The links of the lower divider belt or chain 90 *D* are arranged to break joints with the trough-links *b* in order that the blades of the former shall have proper position to pass upward through the interval between the trough-links.

Compared with the length of the feeding- 95 carrier *B* the lower divider-chain is short, being designed only to assist in effecting the separation of the material on the carrier *B* into sections.

E represents the endless chain of suction- 100 links *e e*, which are provided with rollers *e' e'* to facilitate their movement on the tracks or ways *r* of the framing. In the construction shown in the drawings this endless chain *E*

is arranged above the carrier B and is geared to move at the same rate of speed therewith, as is also the lower divider-chain D. Each link *e* of the chain E carries a divider-plate *e'*, which may be rigidly secured to its frame or may be made adjustable or even removable, as in some cases it may be desirable to include the length of several links in a section of the food material on the carrier. The section-link *e* consists of a rectangular tubular or open frame, its upper portion having an opening *f* communicating with a passage *f'* through the link, the lower portion of said passage being also open, but covered or guarded by a wire-cloth or perforated bearing *a*, the design being to allow air to pass upward or downward through the link freely, as may be required in the operation of the machine. The upper surface of the link *e* is designed to move along in approximate contact with a valve-seat *g*, as indicated in the framing, said valve-seat being provided for use in connection with a transverse reciprocating valve-plate G.

The endless suction-chain E extends beyond the endless carrier B and the endless divider-chain D sufficiently to include the pneumatic chamber or chambers H H'. Usually a single pneumatic chamber H will be sufficient, this being a suction or exhaust chamber, kept in exhausted condition by means of a suitable exhaust-fan, the passage to which is indicated at *k*; but if the food-sections are of such character that they adhere too closely to the wire-cloth bearings *a* of the suction-links it may be necessary to employ the pressure-chamber H', which is provided with a connection to a blower-fan. An opening for the admission of atmospheric air when the suction is cut off will, however, usually prove sufficient to release the biscuit or cracker-section from the wire-cloth bearing *a*, which should be treated with paraffin.

The valve-plates G are arranged in series in ways or seats *g'* of the frame, these being located in the lower portion or bottom of the pneumatic chamber. The number of valve-plates may be equal to one or two more than the number of biscuits or food-sections designed to form a row on the pan or receiver. Each valve-plate is designed to operate in conjunction with a link of the suction-chain above described, as such link comes into position or nearly into position below it. The series of valve-plates corresponds with the series of openings *m* of the pneumatic chamber, and such series is of suitable length to correspond with the length of the pan or receiver, such as indicated at N', Fig. 1, so that when these openings or suction-passages are closed by means of the valve-plates the food-sections will be deposited on the pan in a row. Besides the openings *m* openings are provided in the bottom of the first portion of the pneumatic chamber. The latter openings are not provided with valve-plates, as they are de-

signed to be in continuous action, serving to convey the food-sections or biscuits from the carrier B to the valved portion of the pneumatic chamber, where the depositing operation is effected.

The valve-plates G are provided with passages or openings *g'* and with stop or cut-off portions *g''*.

Below that portion of the pneumatic chamber which is provided with valves is located the pan-carrier table N, which consists of an adjustable frame provided with bearings for the shafts of the sprocket-wheels *s*, which carry the transverse sprocket-chains *b* or endless carriers on which the pans or trays are laid. These sprocket-chains are intermittently operated by means of a pawl F and a ratchet-wheel T, of which one of the teeth (indicated at *t*) is larger circumferentially than the other teeth *t'* in order to provide sufficient movement of the pans when they lie adjacent to each other to pass from the last row of biscuit-sections of a filled pan to the place of deposit on the succeeding pan where the first row of biscuit-sections is to be dropped. The ratchet-wheel T is operated through the pawl F and pivoted connection W by the crank or eccentric J, which is carried on the end of a shaft I, which also carries a series of circular cams V V, each of which corresponds to one of the valve-plates. The cams V are each formed with a circumferential depression *v*, the depression of each succeeding cam being a little longer than that of the preceding cam and so arranged that while the rear inclines *v'* are in line with each other and designed to operate together the forward inclines *v''* are spirally arranged, so that they will act in succession. A series of arms Z are pivoted to the framing or to the wall of the pneumatic chamber, said arms corresponding in number to the valve-plates and being provided with projections *z*, whereby they engage the circular cams heretofore referred to. The free ends of the arms Z are designed to engage projections or arms of the valve-plates G and serve to give motion to said plates when the cams are rotating. Reverse motion is given to the valve-plates by means of springs L, arranged on the stems of the valve-plates, said springs engaging arms *o'* of the framing through perforations in which the stems pass. The valve-plates are adjustable, the stems being threaded and provided with nuts for the purpose.

The shaft I, carrying the cams, is operated from the shaft of the end sprocket-wheel K of the endless chain E by means of bevel-gearing, (indicated at I'.)

Under the arrangement indicated while the valves are opened successively to avoid waste of the exhaust they are closed simultaneously, so that a row of biscuits or food-sections is dropped from the links of the pneumatic belt E to the receiver of the pan on the carrier-table.

The connecting arm or rod W', which extends from the eccentric J to the pawl F, is usually pivoted at w to provide for lateral play, which is advisable in order to allow adjustment of the pan-carrier frame to accommodate said frame to the drop movement of the valves. This adjustment may be effected by the hand-screw H, having a pivotal seat in the framing.

Q indicates a rotary brush, which is designed to act upon the trough-links of the carrier-belt to keep them clean.

The operation may be described as follows: The trough-carrier links conveying the ribbon of food material as it is formed thereon by deposit from the reducing-machines move along the tracks of the framing and pass between the lower divider-chain and the suction-belt. The links of these belts being provided with knives or blades, which operate, preferably, by a pressing or abutting movement, serve to subdivide the band or ribbon of food material into sections. After this subdivision the lower chain of cutter-links leaves the work and the chain of trough-links having conveyed the food-sections under the pneumatic chamber also leaves the work. The biscuits or food-sections being now taken up by the exhaust and being carried in contact with the wire-cloth bearings a along under the pneumatic chamber reach the valved portion, which is normally closed by the mechanism. As each link of the chain E comes under the series of valves a valve is opened, continuing the suction until a sufficient number of biscuits has been carried along the valved portion from a row, when the valves are closed simultaneously and all the biscuits of said row are dropped or deposited on the pan or receiver below. This pan or receiver remains stationary long enough to receive the row of biscuits and is then moved transversely by the action of the ratchet-and-pawl mechanism or other suitable manner the proper distance to attain a position to receive the next row of biscuits, and the action of the valves being repeated a second row of biscuits is deposited alongside the first row.

In the construction illustrated four rows of biscuits are apportioned to each pan, and the fourth ratchet-tooth is made sufficiently longer than the others to allow in the movement of the pan-carrier chains for the interval between the pans.

It will be observed that the drop motion of the valves, wherein they simultaneously close off the exhaust, is intermittent, taking place in the intervals of the intermittent motion of the pan-carrier. In other words, when the pan-carrier is still the simultaneous cut-off or drop motion of the valves takes place quickly enough to allow time for the drop of the biscuits to the pan before the latter is again shifted. To effect this movement of

the valves and the movement of the pan-carriers, the cam-shaft is usually connected to the shaft of the end pulley of the chain E by means of bevel-gearing. In some cases, however, the receiver may have continuous movement.

The machine may be run by means of power applied to a shaft F and gearing F', operating the shafts of the sprocket-wheels B' of the feeding-chain D' of the lower cutter-chain and E' of the pneumatic chain.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. A pneumatic panning or distributive depositing-machine, consisting of an endless belt having open sections provided with perforated or wire-cloth bearings, and adapted to operate in connection with a transversely-moving receiver, and an exhaust-chamber having valved openings, substantially as specified.

2. In a pneumatic panning or distributive depositing-machine, an endless belt having open sections provided with perforated or wire-cloth bearings, substantially as specified.

3. An endless chain or belt having open sections provided with divider-blades, and perforated or wire-cloth bearings, substantially as specified.

4. In a pneumatic panning or distributive depositing-machine, the combination with an exhaust-chamber, and its valved openings, of an endless belt of open links, and perforated or wire-cloth bearings attached to the bottoms of said links, substantially as specified.

5. In a pneumatic panning or distributive depositing-machine, the combination with an endless feeding-carrier, and chain cutters or dividers operating in conjunction therewith, of an exhaust-chamber having valved openings, an endless belt of suction-links, and devices for operating the parts, substantially as specified.

6. The combination with an exhaust-chamber, its openings and valves, an open-link suction-belt, an endless feeding-belt and transverse endless pan-carriers, of devices for giving reciprocating motion to said valves, and intermittent motion to said pan-carriers, substantially as specified.

7. The combination with a pneumatic chamber, its openings and valves, the open-link suction-belt, and the transverse receiver, of the endless feeding-belt, the series of valve-operating cams and devices, the cam-shaft and eccentric and the ratchet-and-pawl devices in connection with said eccentric, for giving intermittent motion to said receiver, substantially as specified.

8. The combination with a pneumatic exhaust-chamber, and an endless feeding belt or carrier, of a suction-belt operating in connection with said exhaust-chamber, valve devices for cutting off the exhaust, a transverse

receiver and mechanism for giving intermittent motion to said receiver; and alternate intermittent out-off motion to said valve devices, substantially as specified.

- 5 9. The combination with a pneumatic exhaust, its valves, and a continuous feed-belt of an endless suction-belt operating in connection with said exhaust, valves and feed,

and a transversely-moving receiver, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

MAUD Y. ANDERSON,
BERTHA E. SUTTON.

No. 681,656.

Patented Aug. 27, 1901.

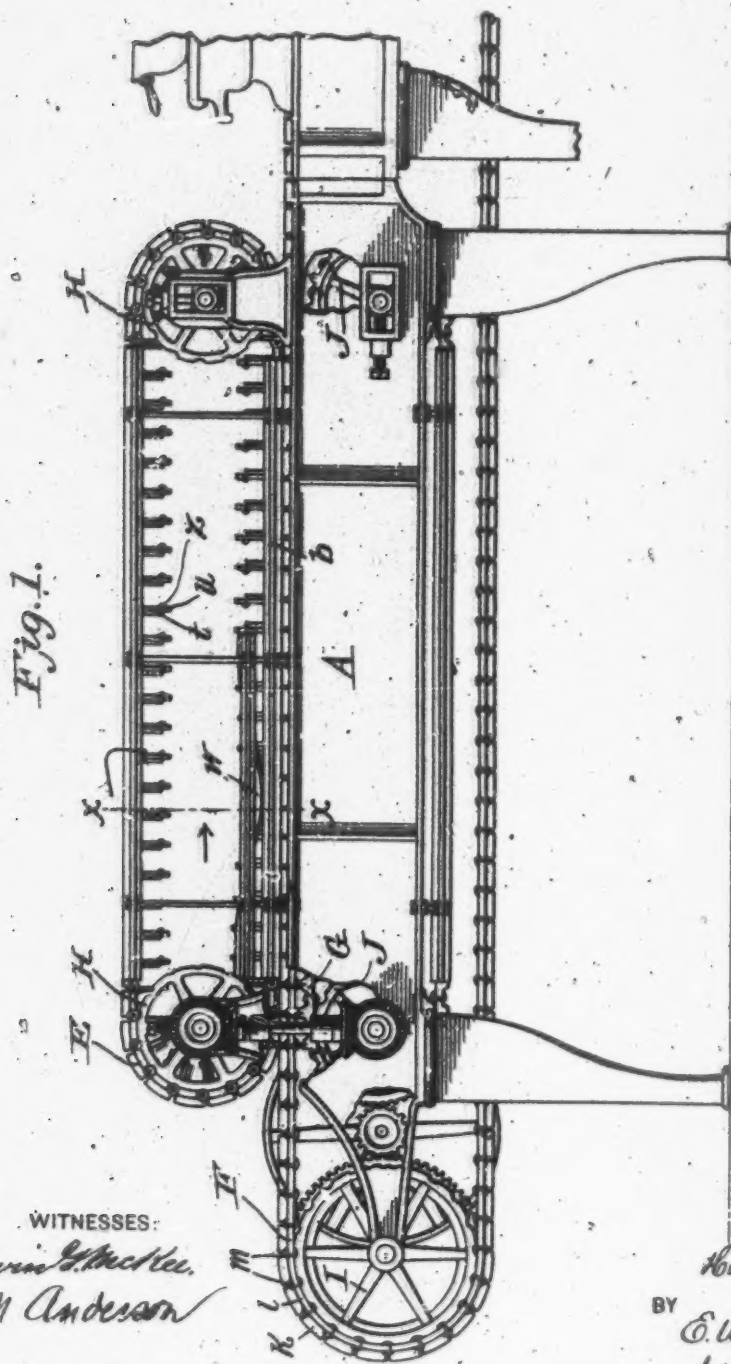
H. D. PERKY.

CONTINUOUS CUTTING MACHINE.

(Application filed Dec. 9, 1899. Renewed Feb. 9, 1901.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

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G M Anderson

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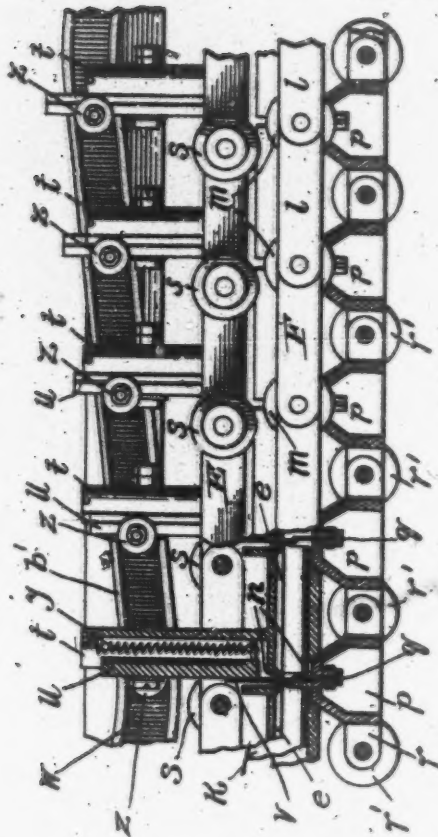
CONTINUOUS CUTTING MACHINE.

(Application filed Dec. 9, 1899. Renewed Feb. 9, 1901.)

(No Model.)

3 Sheets—Sheet 2.

Fig. 2.



WITNESSES:

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Patented Aug. 27, 1901.

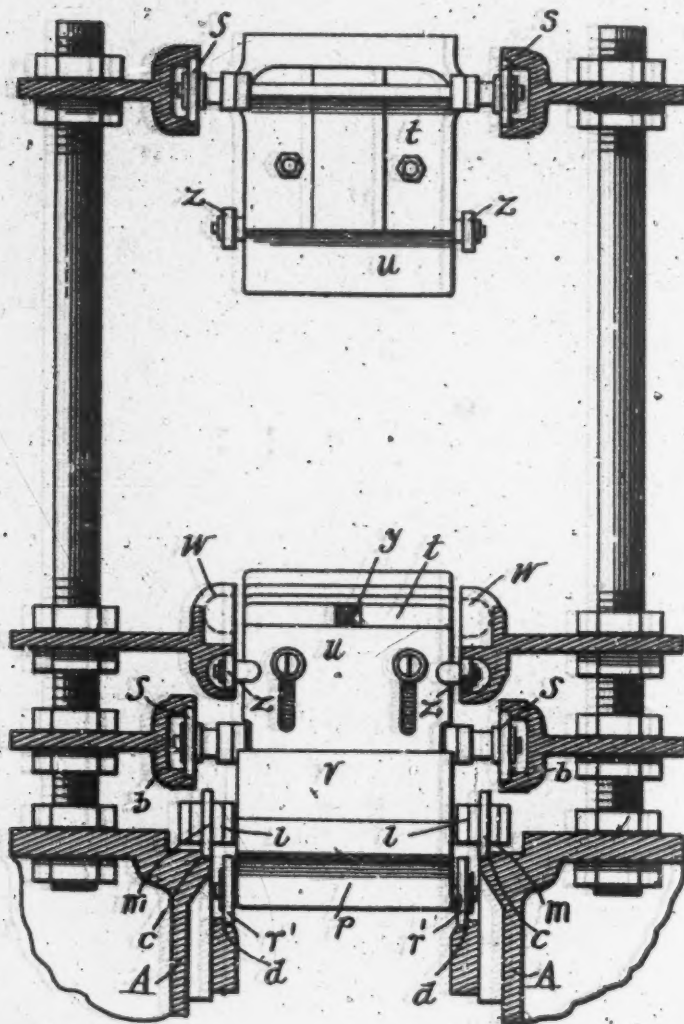
CONTINUOUS CUTTING MACHINE.

(Application filed Dec. 9, 1900. Renewed Feb. 9, 1901.)

(No Model.)

3 Sheets—Sheet 3.

Fig. 3.



WITNESSES:

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Henry D. Perky.

BY

E. W. Anderson

ATTORNEY.

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF WORCESTER, MASSACHUSETTS.

CONTINUOUS CUTTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 681,656, dated August 27, 1901.

Application filed December 9, 1899. Renewed February 9, 1901. Serial No. 46,722. (No model.)

To all whom it may concern:

Belt known that I, HENRY D. PERKY, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Continuous Cutting-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In the accompanying drawings, Figure 1 is a side elevation of the invention. Fig. 2 is a partial longitudinal section showing the guideways; and Fig. 3 is an enlarged section on the line $x x$, Fig. 1.

This invention has relation to machines for cutting shredded wheat and other food preparations into regular and uniform sections; and it consists in the novel construction and combinations of devices hereinafter set forth, and more particularly pointed out in the appended claims.

In the accompanying drawings, illustrating the invention, the letter A designates the frame of the machine, having parallel sides and elongated form. The frame is formed with tracks or ways, as b , c , and d , upon which the side lugs of the endless-chain belts E, F, and G, respectively, travel, said belts being carried by their end sprocket-wheels H, I, and J. The middle belt F is made of iron, and consists of short sectional troughs having lateral flanges k and side lugs l . The links or short troughs are pivoted together by means of pins passing through the side lugs, and these lugs usually carry small rollers m , whereby their passage along the track c is facilitated and whereby engagement with the rims of the sprocket-wheels is effected. The body of each trough-section is formed on its under side with a broad transverse rib, the sides of which are beveled in such manner that each two successive links provide between them a transverse recess, (indicated at n .) The belt F so formed constitutes an endless sectional trough having between the sections narrow intervals for the passage of the blades of the cutter-belts. The lower cutter-belt G consists of an endless chain of knife sections or links each consisting of a body portion p , having its sides beveled and being

properly portioned to engage the recess n of the trough-belt F. The knife-sections are provided with the transverse blades q and with lateral lugs r , usually bearing the rollers r' and being pivoted together to connect the sections in chain form. When the machine is in operation, the blades q pass upward in succession between the sections of the trough belt. These blades pass upward into the trough sufficiently to lift the material somewhat and to coact with the blades of the upper cutter-belt. The upper cutter-belt E also consists of section-links provided with lateral lugs pivoted together and usually having the lateral rollers s . The under side or face of the body portion of the link may be plane, but is preferably fashioned in mold form having a beveled edge rib e , (see Fig. 2,) adapted to gather the material somewhat and give it shape as it presses thereon in its downward movement. At the adjacent edges of the sections these ribs or lips also serve to compress the material against the rising blades of the lower cutter, in this manner facilitating the action of the blades of the upper cutter in their descent. At the back of each section of the upper cutter is provided a frame portion or flange t , forming a way for the blade-frame u , which carries the blade v , which has its movement along the plane of the edge face of the section downward to pass the rising blade of the lower cutter in a shearing manner. In order to effect this, camways w are provided on the main frame at each side above the trackways b , said trackways in this part having over-flanges b' , adapted to prevent the body portions of the knife-sections from leaving the trackways. The camways w , which dip downward, as indicated, and have a subsequent rise, are designed to engage the rollers z , which are connected to lateral lugs of the blade-frame u . As the knife-sections pass along their trackway toward the end of the machine the rollers of the blade-frame enter the camways w and are operated thereby to depress the blade-frame and blade to make the cut and then to raise the blade-frame and blade, withdrawing the latter from the material through the aid of the edge rib or lip of the section-body. The blade and blade-frame are held in raised position by means of the

friction-springs *y*, which bear against the slot-bolts connecting the parts. That portion of the machine in front of the camway is made sufficiently long to provide for pressing the biscuit in form. The three endless belts *E*, *F*, and *G* travel at the same rate of speed and are accurately formed and geared in order that the action of the cutter-blades shall be neat and close. The position of the

lower cutter-blades is accurately defined by means of the engagement of the lower cutter-bodies with the interval recesses of the belt-trough, and provision is made for micrometric adjustment of the upper cutter by means of slanting set-screws of its sprocket-wheels passing through the hubs thereof and engaging abutments of the shaft on which they are keyed.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with a traveling sectional carrier-belt composed of trough-links, of a lower chain cutter-belt having link-blades adapted to pass upward between the trough-links, an upper chain cutter-belt, the plane-tracks and cam-tracks of the frame, whereby the movements of the belts are controlled, and the sprockets and gear devices, whereby the belts are connected to move at the same rate of speed, substantially as specified.

2. The combination with the link troughs, and their connected frames and rollers, of a

lower chain cutter-belt having fixed blades and devices for engagement with the interval recesses of the trough-links, substantially as specified.

3. The combination with link troughs, and their connected frames, of the lower chain of link cutters, and an upper chain of links having reciprocating blades, and mechanism for operating, substantially as specified.

4. The combination with camways in the frame, and the connected section-troughs, of an upper chain of connected links, their adjustable blades and sliding frames, having lateral lugs to engage the camways, substantially as specified.

5. The sectional cutter-link, consisting of the body portion and its connecting lugs and rollers, its mold-form face, its trackway, movable blade-frame, adjustable blade and friction-springs, substantially as specified.

6. In a continuous cutting-machine, the combination with chain of section-troughs, of a lower chain of knife-links, engaging said chain of section-troughs, and an upper chain of links carrying movable cutters and means for reciprocating said cutters, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

J. R. GILKESON,

ALBERT H. CHAFFEE.

No. 683,100.

L. S. BURBANK.

Patented Sept. 24, 1901.

APPARATUS FOR FACILITATING PACKING.

(Application filed Dec. 21, 1899.)

(No Model.)

2 Sheets—Sheet 1.

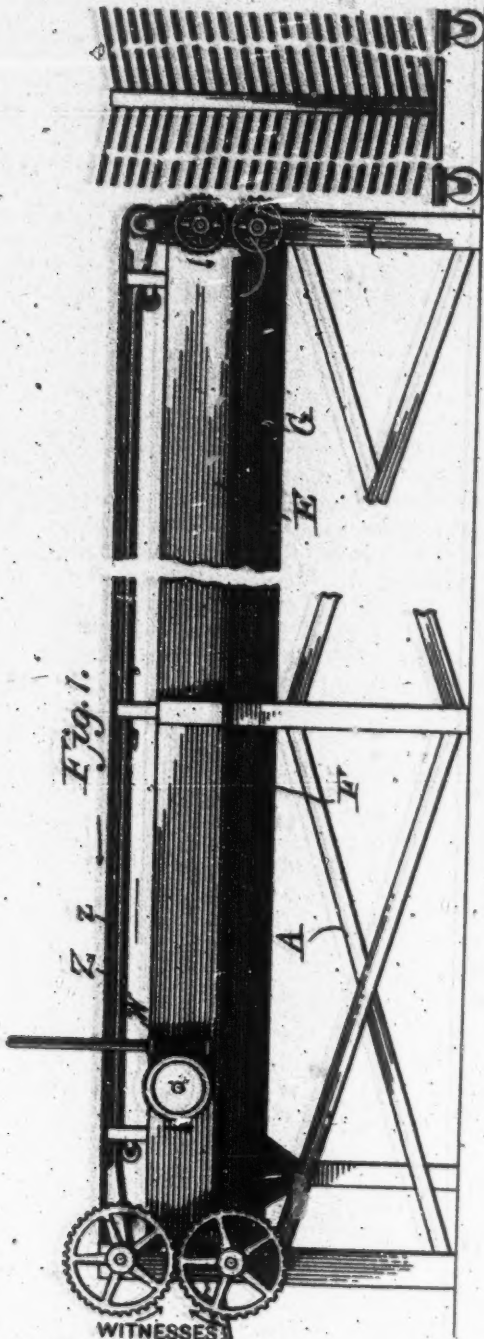


Fig. 1.

WITNESSES

Edwin McKee
G. M. Anderson

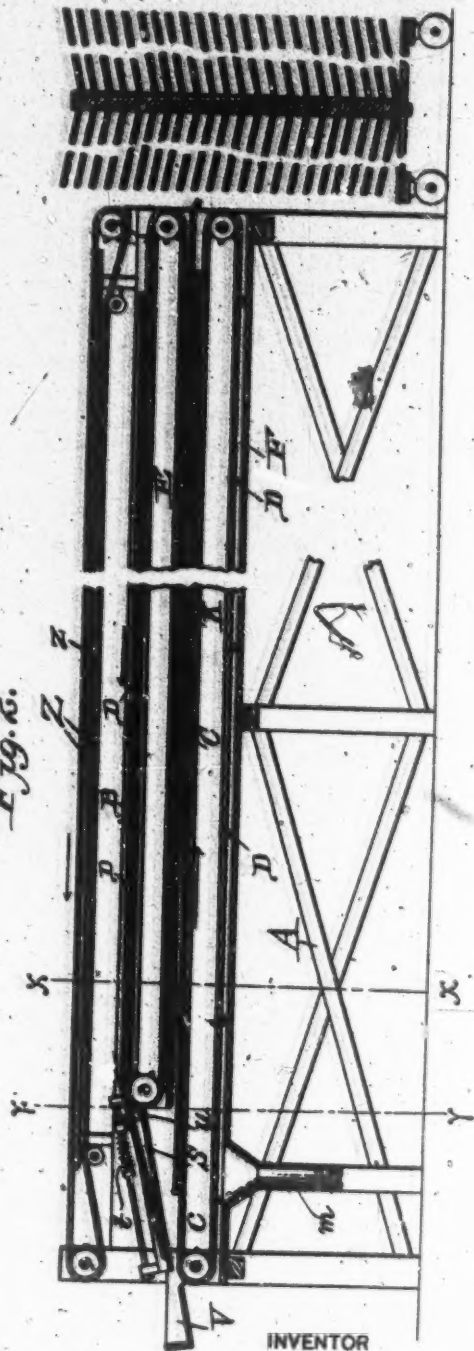


Fig. 2.

INVENTOR

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BY

G. W. Anderson
his ATTORNEY.

No. 893,100.

L. S. BURBANK.

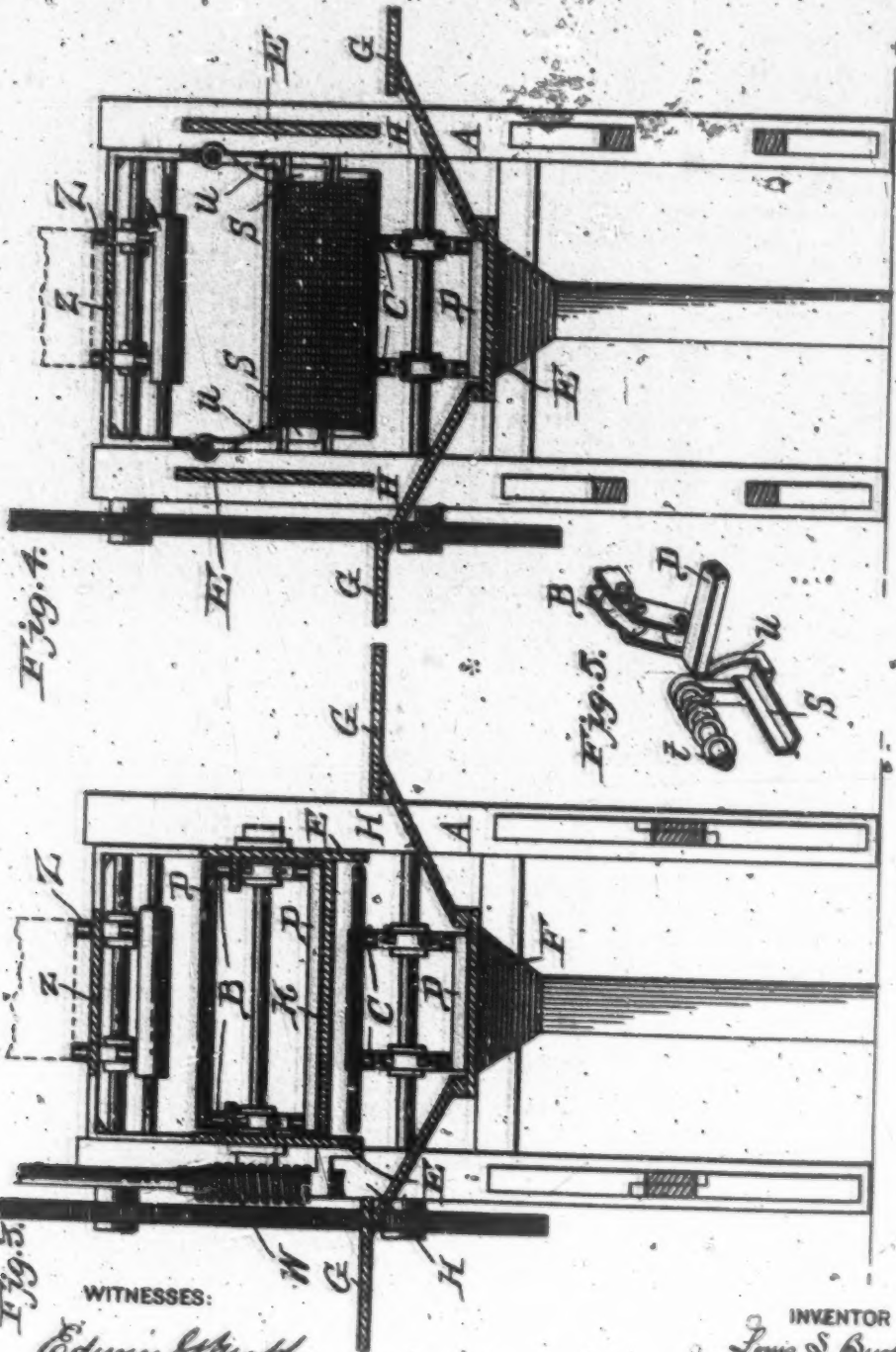
Patented Sept. 24, 1901.

APPARATUS FOR FACILITATING PACKING.

(Application filed Dec. 21, 1900.)

(No Model.)

2 Sheets—Sheet 2.



WITNESSES:

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INVENTOR

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UNITED STATES PATENT OFFICE.

LOUIS S. BURBANK, OF WORCESTER, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NATURAL FOOD COMPANY, OF NIAGARA FALLS, NEW YORK.

APPARATUS FOR FACILITATING PACKING.

SPECIFICATION forming part of Letters Patent No. 688,100, dated September 24, 1901.

Application filed December 21, 1899. Serial No. 741,078. (No model.)

To all whom it may concern:

Be it known that I, LOUIS S. BURBANK, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Apparatus to Facilitate Packing; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In the accompanying drawings, Figure 1 is a side elevation of my apparatus. Fig. 2 is a vertical longitudinal section of same. Fig. 3 is a section on the line *x x*, Fig. 2. Fig. 4 is a section on the line *y y*, Fig. 2; and Fig. 5 is a detail view illustrating the engagement of the cross-bars *D* with the slideways.

The invention has relation to means for facilitating packing small articles, such as crackers, biscuit, cakes, &c., in cartons or cases; and it consists in the novel construction and combination of devices, as hereinafter set forth.

In the accompanying drawings the letter *A* designates a frame, of elongated form, in which the end sprockets or pulleys of the endless carriers *B* and *C* are mounted. Chain carriers are preferred when the goods are delivered in baking pans or trays. The lateral chains of each carrier are connected at intervals by means of transverse bars or scrapers *D*. The casing of the frame consists of side walls *E* and a bottom or trough portion *F*. The upper tray-holding portion of the upper carrier is exposed for the action of the packers, who are located when work is to be done along the sides of the apparatus before the lateral ledges or table-flanges *G* of the frame. Openings are provided at *H* at the inner edges of the packing-ledges *G*, said openings leading to the inclosed trough portion *F*, in which the lower carrier *C* runs. The floor of the chamber or boxing of the upper carrier is indicated at *K*, and in this floor, near the feed end, chutes or openings may be provided for the passage of waste material downward into the lower or trough chamber, from which it escapes through a chute *m* for such disposition as may be advisable. The lower carrier

is at one end of the apparatus extended beyond the end of the upper carrier, this extension (indicated at *c*) serving to receive the empty pans or trays when they are dropped thereon by the opening of the lateral receiver-slideways *S*, which are provided with clean-springs *t*. These slideways are located in parallel inclined position over the extension *c* of the lower carrier, their higher ends being near the sprockets of the chain carrier and having beveled projections, as at *u*, which are intermittently engaged by the ends of the cross-bars *D* during the movement of said carrier. This engagement causes the slideways to open or separate sufficiently to allow the pan or tray thereon to fall upon the lower carrier in position to be taken thereby and returned to the feed end of the apparatus. A stop extension *V* beyond the ends of the slideways and having an inclined bottom serves to prevent the pans or trays from passing too far beyond the ends of said slideways to be engaged by the return carrier. This stop extension also serves to cause the tray to come nearly to a counterbalance, so that it falls gently on the return chain. Elevated a little above the pan-carrier *B* is arranged a narrow endless carrier-belt *Z*, which is supported by a board *z* and serves to receive the packed cartons and conveys them away for further disposition. The carriers are moved by means of slow gearing, (indicated at *W*.)

The operation is as follows: An attendant at the feed end places the charged pans or trays upon the distributing-carrier *B*, which conveys them along between the lines of packers at the table-ledges, who, taking the biscuit or other articles from the trays as they move along on the carrier, pack them in cartons which are provided at hand and place the filled cartons on the upper small carrier to be conveyed away. The empty pans or trays are carried along to the end of this carrier and discharged upon the automatic slideways at its end, whereby they are dropped upon the lower carrier to be returned to the attendant. The cross-bars or scrapers of the carriers on their return movements, being turned downward, move along the floors of their respective chambers and carry such

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waste material as may have accumulated therein to the chutes at the ends of said chambers. The importance of this apparatus in handling large quantities of delicate articles is found not only in saving time and floor-space, but also in avoiding all manipulation of the goods but that which is necessary to place them in the cartons.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with an upper endless tray-carrier, and a lower endless tray-carrier moving in the opposite direction, and extending at one end, beyond the upper tray-carrier, of the lateral intermittently-acting slide-ways at the end of the upper carrier and above

the extension of the lower carrier, substantially as specified.

2. The combination with the upper and lower chambers, and the upper and lower tray-carriers respectively located therein, of the lateral packing-edges of the frame, the waste chutes and openings, the carton-carrier, and the automatic drop device for the trays at the end of the upper carrier and over an extended portion of the lower carrier, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS S. BURBANK.

Witnesses:

ALBERT H. CHAFFEE,
J. R. GILKESON.

No. 883,101.

L. S. BURBANK.

Patented Sept. 24, 1901.

APPARATUS FOR CURING OR DRYING GRAIN.

(Application filed Dec. 20, 1900.)

(No Model.)

2 Sheets—Sheet 1.

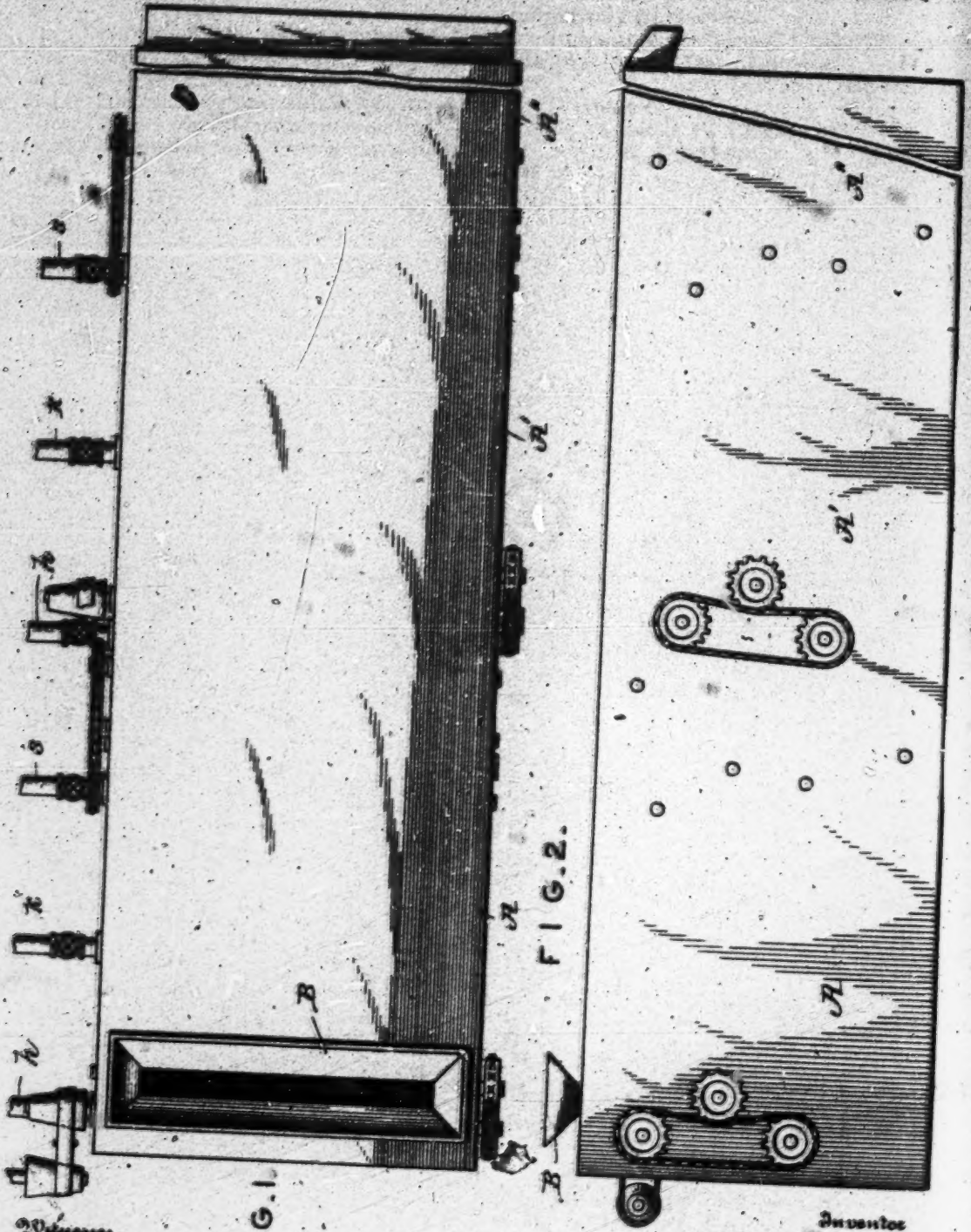


FIG. 1

FIG. 2.

Witnesses
Harry L. Ames.
Wm. Anderson

Inventor
Louis S. Burbank.
W. W. Anderson
 his Attorney



No. 883,101.

Patented Sept. 24, 1901.

L. S. BURBANK.

APPARATUS FOR CURING OR DRYING GRAIN.

(Application filed Dec. 40, 1899.)

(No Model.)

2 Sheets—Sheet 2.

FIG. 5.

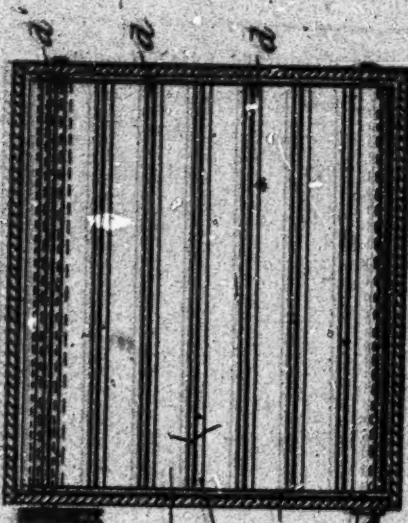


FIG. 4.

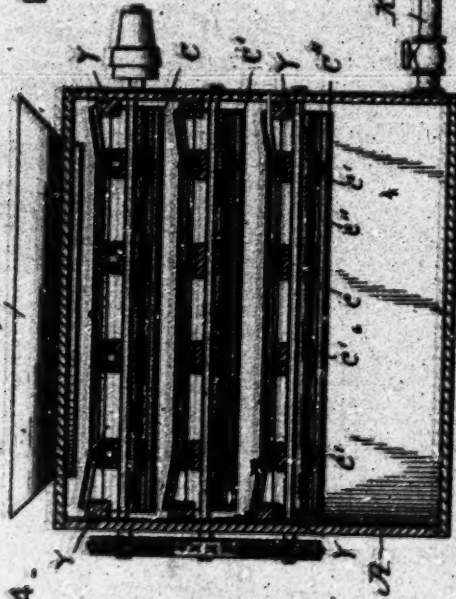
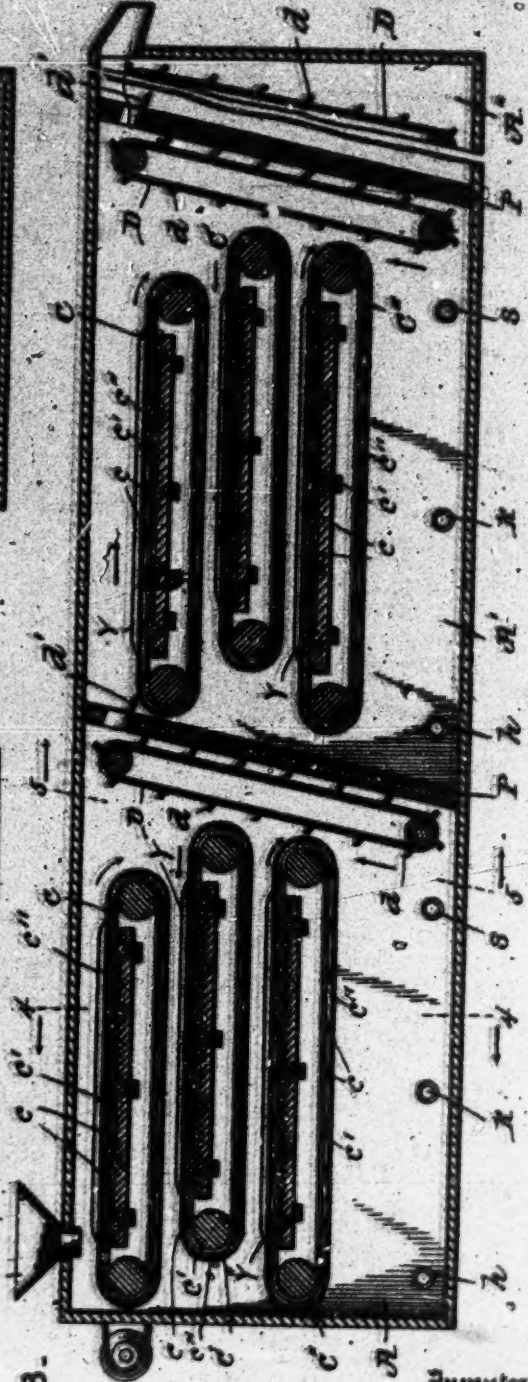


FIG. 3.



Witnesses

Harry L. Ames.
J. M. Anderson

Inventor

Louis S. Burbank.

by E. W. Anderson
his Attorney

UNITED STATES PATENT OFFICE.

LOUIS S. BURBANK, OF WORCESTER, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NATURAL FOOD COMPANY, OF NIAGARA FALLS, NEW YORK.

APPARATUS FOR CURING OR DRYING GRAIN.

SPECIFICATION forming part of Letters Patent No. 888,101, dated September 24, 1901.

Application filed December 30, 1899. Serial No. 742,122. (No model.)

To all whom it may concern:

Be it known that I, LOUIS S. BURBANK, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Curing or Drying Grain or other Matter; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In the accompanying drawings, Figure 1 is a plan view of my machine, partly broken away. Fig. 2 is a side elevation of the same. Fig. 3 is a central longitudinal section of the same. Fig. 4 is a section on the line 4 4, Fig. 3; and Fig. 5 is a section on the line 5 5, Fig. 3.

This invention is designed chiefly to provide means for curing grain as it comes from the boilers when it has been cooked in such manner as not to destroy the entire form of the berry, and it may be found useful for other curing or drying purposes.

The invention consists in the novel construction and combination of devices, as hereinafter set forth.

In the accompanying drawings the letters A A' A" designate chambers or compartments which are arranged in series, but are nevertheless isolated from each other in such manner that the temperature or moisture of the air in each can be changed at will without affecting the condition of the air in any of the other chambers. The isolating walls or partitions P are usually inclined, as indicated, in order to economize space and to facilitate the employment of slatted elevator-belts, these being necessarily of broad character in order to convey the grain from one compartment to the next in spread condition.

B represents a discharge-spout delivering the grain into the first compartment and upon the upper horizontal carrying-belt of the series C C' C'', which are arranged one below another, the belts below the upper one having their end portions projecting alternately at opposite ends of successive belts beyond the ends of the overlying belts in such man-

ner that the material falls from the end of each overlying belt upon the projecting end portion of the next belt below, and so on in succession, each belt having a reverse motion from that of the one above it. The material falling from the end of the lowest belt is received upon the lower end of the broad inclined elevator E, is carried up in spread form by the slats d thereof through the upper portion of the partition P, and is discharged by the spout d' upon the upper belt of the next compartment or chamber, in which the belts are also arranged in series one below another, with the ends of alternate belts oppositely projecting, as already described in referring to the arrangement of the carrying-belts in the first compartment. The grain from this chamber is transferred by a similar inclined elevator to the belts of the next chamber or compartment, and so on throughout the series of compartments until it is discharged from the last one of the series. Each carrying-belt consists of an endless stretch or skeleton belt of transverse slats c and endless straps c' and which is covered over with the removable endless apron c''. The end portions of each said slat are shown as separate from their central portions, the extremities of said end and central slat portions being glued or otherwise suitably secured to the outer straps c' in such manner as to allow such end portions a hinged or pivotal movement with respect to said central portions of the slats. The belts of the compartments are run by means of end rollers having suitable sprocket-wheels upon the ends of their shafts, and between these end rollers are provided supporting-rolls and plane bearings or shelving to keep the upper branch of each belt flat and prevent sagging. The speed of the series of belts in each chamber is slow and is adjustable, suitable differential driving devices being provided to enable the speed to be varied in accordance with the requirement of the material. Each compartment is in communication with a hot-air supply, as indicated at h, with a cold-air supply having an inlet, as at k, and with a steam-supply, as at s, these inlets having suitable cut-off valves. In the

first compartment the air is heated in order to effect the drying or partial drying of the grain, which passing into the cooler chambers is carried more slowly along, so that it becomes in a manner piled up or banked upon the belts in order that the outer portion of the grain shall become scented or cured and fit for the action of the redging-machine. Should the grain not possess sufficient moisture for this purpose after coming from the heated drying-chambers, moist air or steam should be admitted into the banking-chambers to assist in the curing process. The transverse slats of the aprons or belts should be provided with hinged flanges or end portions designed to engage lateral guides Y, extending along the sides of the apron at their middle portion between the end rollers to allow for the heaping or banking of the grain on the aprons. These guides terminate short of the roller ends to allow room for the apron to take its flat position in passing downward over the roller. The canvas belts are de-

signed to be taken off from the stretch-belts for removal, washing, or other purpose.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

Apparatus for the purpose described, consisting of a series of chambers having each means for regulating the temperature and moisture, traveling carriers having means for adjusting their speed, and formed of the endless straps, the transverse slats having end portions adapted to have a hinged or pivotal movement with respect to the main portions thereof, the removable aprons, the lateral guides, and transfer-elevators forming means of communication from one chamber to the next, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS S. BURBANK.

Witnesses:

J. R. GILKESON, A
ALBERT H. CHAFFER.

No. 684,789.

Patented Oct. 22, 1901.

L. S. BURBANK.

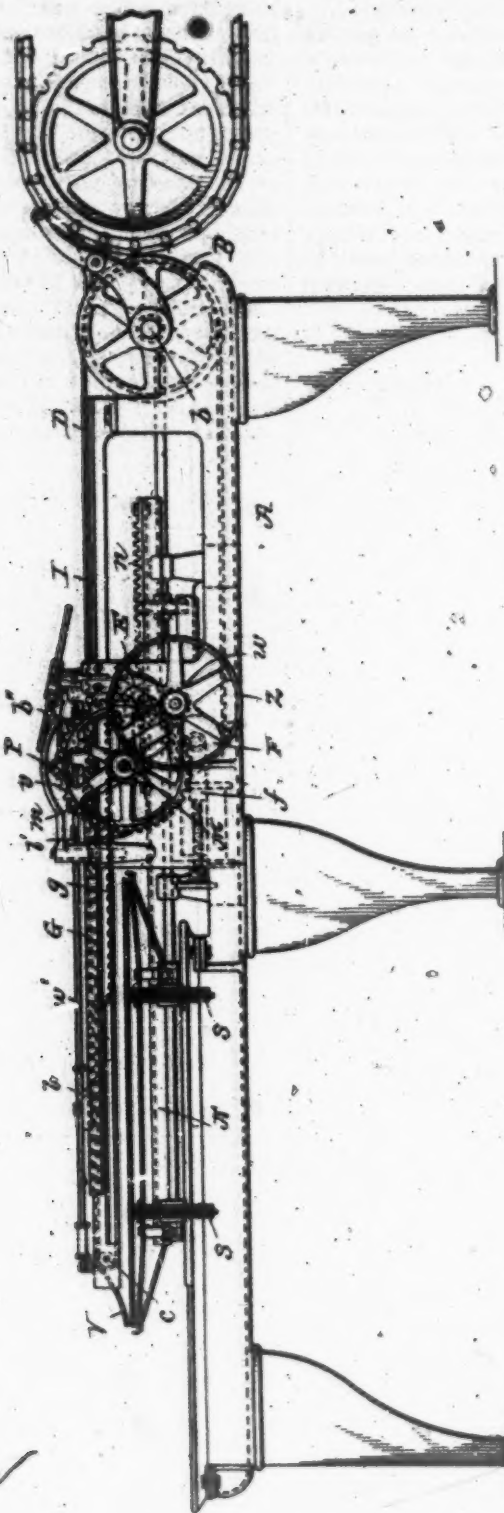
DISTRIBUTIVE DEPOSITING OR PANNING MACHINE.

(Application filed Dec. 20, 1899.)

(No Model.)

3 Sheets—Sheet 1.

FIG. 1.



Witnesses

Harry L. Ames,
 & M. Anderson

Inventor

Louis S. Burbank.

by E. W. Anderson
 his Attorney

L. S. BURBANK.

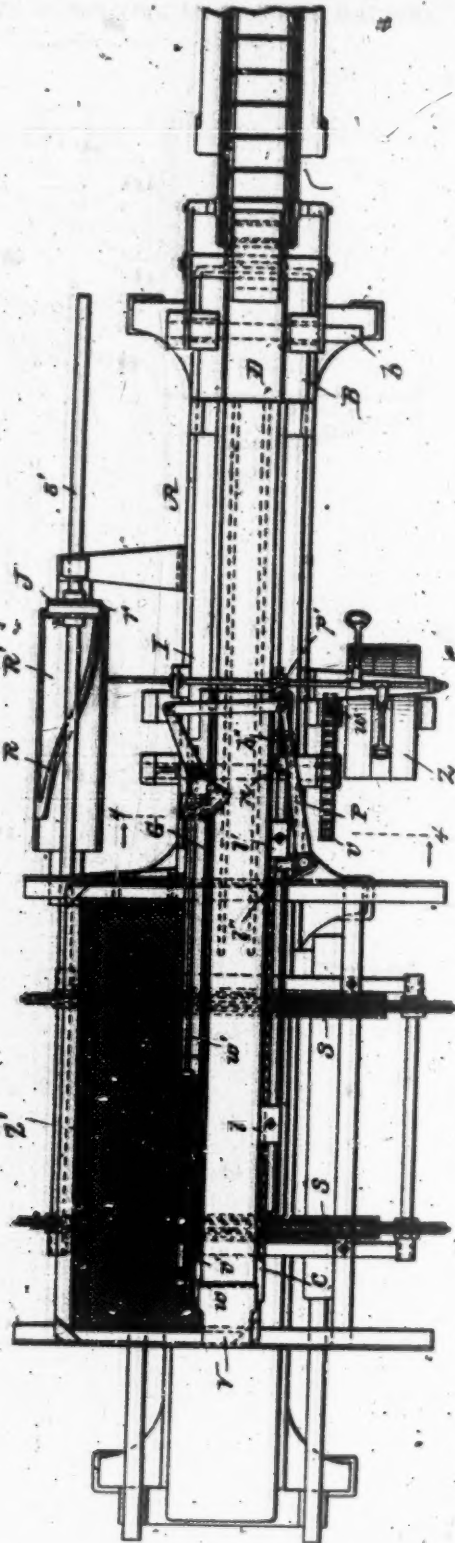
DISTRIBUTIVE DEPOSITING OR PANNING MACHINE.

(Application filed Dec. 30, 1900.)

(No Model.)

3 Sheets—Sheet 2.

FIG. 2.



Witnesses

Harry L. Ames.
E. W. Auden.

Inventor

Louis S. Burbank.

by E. W. Auden.

his Attorney

L. S. BURBANK.
DISTRIBUTIVE DEPOSITING OR PANNING MACHINE.

(Application filed Dec. 29, 1899.)

(No Model.)

3 Sheets—Sheet 2.

FIG. 4.

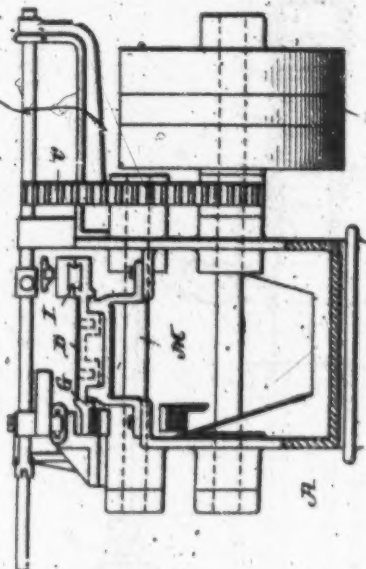
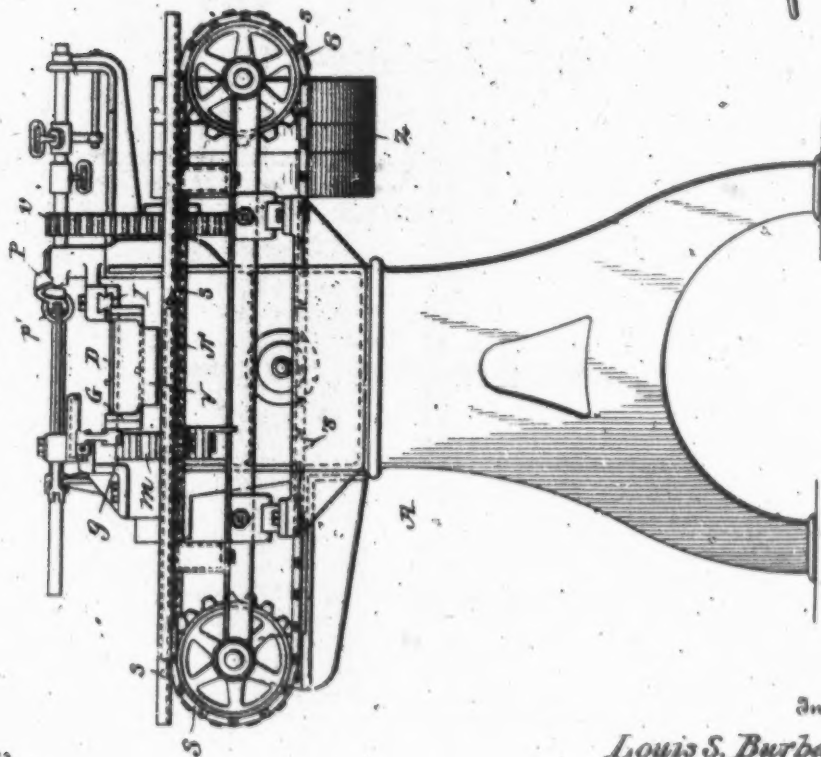


FIG. 5.



FIG. 3.



Witnesses

Harry L. Ames.
E. W. Anderson.

Inventor

Louis S. Burbank.

E. W. Anderson
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Attorney

UNITED STATES PATENT OFFICE.

LOUIS S. BURBANK, OF WORCESTER, MASSACHUSETTS.

DISTRIBUTIVE DEPOSITING OR PANNING MACHINE.

SPECIFICATION forming part of Letters Patent No. 684,789, dated October 22, 1901.

Application filed December 30, 1898. Serial No. 742,121. (No model.)

To all whom it may concern:

Belt known that I, LOUIS S. BURBANK, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Distributive Depositing or Panning Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In the accompanying drawings, Figure 1 is a side elevation of my machine. Fig. 2 is a plan view of the same. Fig. 3 is a front elevation of the same. Fig. 4 is a section on the line 4 4, Fig. 2; and Fig. 5 is a detail view illustrating the adjusting mechanism for the depositing-lip.

The object of the invention is to provide a machine for depositing in regular order and in parallel rows upon pans or receivers sections or cakes of shredded wheat or other preparations for cooking and for such other purposes as it may be found useful; and it consists in the novel construction and combinations of devices, as hereinafter set forth.

In the accompanying drawings, illustrating this invention, the letter A designates the main frame of the machine, and B a pulley having its bearings therein near one end, its shaft projecting for the application of power. Around the pulley B passes one end portion of a carrier-belt D, which extends horizontally along the frame and passes around the small end pulley C and below and around the take-up pulley E and the tension-pulley F, the latter being also connected to the main frame of the machine, an adjustable bearing f being provided for the purpose. The pulleys C and E are mounted in bearings of a reciprocating carriage G, the operation of which is designed to alternately shorten and lengthen the carrying portion of the belt D, so that while the receiving portion of this belt moves along continuously and steadily with the sections of biscuit or cakes deposited thereon the other end portion of the belt shortens and lengthens itself alternately, by the one movement depositing the biscuit-sections upon the receiver

or pan Z' and by the other movement carrying forward the line or feed of biscuit-sections to be deposited in the second row upon said receiver or pan parallel to the first row, a lateral adjustment and longitudinal retraction of the receiver or pan taking place while the depositing-belt is lengthening. The reciprocating carriage G is geared to move at the same rate of speed as the pulley B and as the reciprocating carriage N of the receivers or pans.

The main frame is provided with slideways I for the carriage G, to which is connected the small end pulley C and the intermediate pulley E, which when the delivery portion of the belt is retracted by the backward movement of the carriage G also moves backward and serves as a take-up for the shortening-belt.

M indicates a reversing-shaft having a pinion m, which engages by its upper portion the rack g of the belt-carriage G and by its lower portion the rack n of the carriage N of the pans or receivers. By means of this pinion and a reversing-shifter, in connection with fast and loose pulleys at Z, these carriages are reciprocated in opposite directions, but at the same rate of speed.

The carriage N of the receivers having the lower rack n carries the sprockets of the chains S, upon which the receivers or pans are placed in position to receive the biscuit-sections from the depositing portion of the belt D. The sprocket-chains run transversely, and they are provided with guide-studs s, placed at proper intervals to insure the correct position of the pans when laid on said chains. The operation of these sprocket-chains by means of slide-shaft s', its pawl device r, and the cam J serves to give the proper intermittent lateral movement to the receivers or pans. This lateral movement is effected as the carriage is moving backward, the slide-shaft of the sprockets during this movement moving its pawl device or disk along the camway R, so that one of its pawls r engages the spiral cam-rib R, turning said shaft. During the forward movement of the carriage the pawl r passes loosely over the

cam-rib, so that there is no engagement therewith, and the pan on the carriage moves in a direct line.

At the end of the carriage G is provided a depositing lip or slide V, which takes the biscuit sections from the end of the carrier belt D and passes them down its incline to the receiver. By means of suitable gearing (indicated at v and w and operating in connection with the reversing mechanism) this depositing lip is raised at the end of the movement of delivery and held in the raised position until the attendant belt D is ready to place another row of biscuit sections on the receiver, when said lip is lowered promptly to inclined position and so held until the delivery of this row is completed. The movement of reversal of the depositing lip takes place at the time of the movement of reversal of the carriage, and is effected by the same reversing device. A screw screw c in connection with the threaded end of the rod or screw to change the relative position of said worm, so that an adjustment of the degree of inclination of the depositing lip may be readily effected while the machine is in motion. The reversing mechanism is operated automatically by the carriage G through its lugs l and f, which alternately engage a dog P of the switch lever R. The lugs l and f are slides which are adjustable on a longitudinally adjustable bar at the side of the carriage, which serves as a bearing for said lugs, being engaged by longitudinal channels in the bottoms thereof. These lugs when their adjustment is fixed on this bar are conjointly adjustable by means of a right and left screw S engaging a threaded lug of said bar. As either or both lugs are therefore adjustable, means are provided for lengthening or shortening the stroke or varying its position. These adjustments are important in arranging the terminal position of the receiver carriage as well as that of the depositing lip of the carrying belt with reference to the position of the biscuit sections. The switch lever R by means of the slide p actuates the reversing belts of the fast and loose pulleys and also operates the reversing gear of the delivery lip. The biscuit sections being fed in regular succession upon the belt D are by means of its reciprocating end portion and the depositing lip placed upon the receiver or pan, the operating mechanism of which by causing an intermittent lateral movement of said receiver or pan serves to produce an arrangement of the biscuit sections in parallel rows thereon. As one pan is filled another pan is placed upon the carriage to be filled. Usually the receiver carriage is made wide enough to hold two or more pans side by side in order to give the attendant time enough to remove a filled pan and to place an empty one upon the sprocket belt while an intermediate pan is being filled.

Having described this invention, what I

claim, and desire to secure by Letters Patent is—

1. The combination, with a carrier-belt having a reciprocating end portion, of a reciprocating receiver-carriage, and means effecting the reciprocation of both in the same times, and at the same rate of speed, substantially as specified.
2. A carrier-belt, in combination with driving-pulley at one end, and a reciprocating pulley at the other end, the additional tension-pulley and the intermediate reciprocating take-up pulley, and mechanism for operating the pulleys, whereby the belt is caused to lengthen and shorten itself at the delivery end, substantially as specified.
3. The combination, with the carrier-belt, its stationary and reciprocating pulleys, and the carriage, for the latter, of the rack-and-pinion device for reciprocating said carriage, substantially as specified.
4. The combination with a continuously moving carrier-belt, having a lengthening and shortening depositing portion, of a transversely moving receiver, substantially as specified.
5. The combination with a continuously moving carrier-belt having a lengthening and shortening end portion, of a correspondingly reciprocating receiving device having an intermittent transverse movement, substantially as specified.
6. The combination with a depositing carrier-belt of an intermittently and transversely moving receiving device, and a longitudinally reciprocating carriage for said receiver, substantially as specified.
7. The combination with a carrier-belt, having a reciprocating end portion, and a reciprocating carriage bearing the pulleys of said end portion, of a transversely moving receiving device, and its reciprocating carriage, substantially as specified.
8. The combination with a carrier-belt, having a lengthening and shortening end portion, pulleys therefor, and a reciprocating carriage for the pulleys of said portions, of the transversely and intermittently moving receiving device, its reciprocating carriage, and reversing mechanism, substantially as specified.
9. The combination with a depositing carrier-belt, having a lengthening and shortening end portion, and a reciprocating carriage for the pulleys of said portion, of a transversely and intermittently moving receiving device, its reciprocating carriage, and rack-and-pinion mechanism, and a reversing device, substantially as specified.
10. The combination with the lengthening and shortening carrier-belt and the pulleys of its depositing portion, of the transversely and intermittently moving receiving device, the carriages for said pulleys and for said receiving device, and means for reciprocating said carriages in opposite directions at the same rate of speed, substantially as specified.

11. The combination with a reciprocating depositing device, of a receiver, transverse sprocket-chains and sprocket-pulleys thereon, and mechanism for operating said chains intermittently, substantially as specified.

12. The combination with the reciprocating receiver frame, and its transverse sprocket-chains and sprocket-wheels, of the slide shaft, its pawl device and cam, substantially as specified.

13. The combination with the reciprocating end portion of the carrier-belt, and its pulley, of the pivoted depositing lip or slide reversing device, whereby said lip is raised and lowered, substantially as specified.

14. The combination with a depositing carrier-belt, having a reciprocating end portion and a reciprocating carriage for said end portion, and reversing mechanism operated automatically by said carriage, substantially as specified.

15. The combination with a depositing carrier-belt, and a reciprocating carriage operating its end portion, of adjustable reversing mechanism operated automatically by said carriage, substantially as specified.

16. The combination with the receiver-frame and the carrier-belt, of the oppositely-reciprocating carriages, the transverse intermittently-moving sprocket-chains; the depositing-lip, and automatic reversing device, substantially as specified. 30

17. A distributing-machine, comprising an endless carrier, having an alternately extending and retracting end portion, an alternately rising and falling depositing-lip at the end of said end portion, a transverse intermittently-moving receiver device, a reciprocating carriage therefor, and automatically-operated reversing mechanism, substantially as specified. 35 40

18. A carrier-belt having a lengthening and shortening end portion, and end pulley, and a take-up pulley and a reciprocating carriage for said end and take-up pulleys, substantially as specified. 45

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS S. BURBANK.

Witnesses:

J. R. GILKESON,

ALBERT H. CHAFFEE.

No. 885,671.

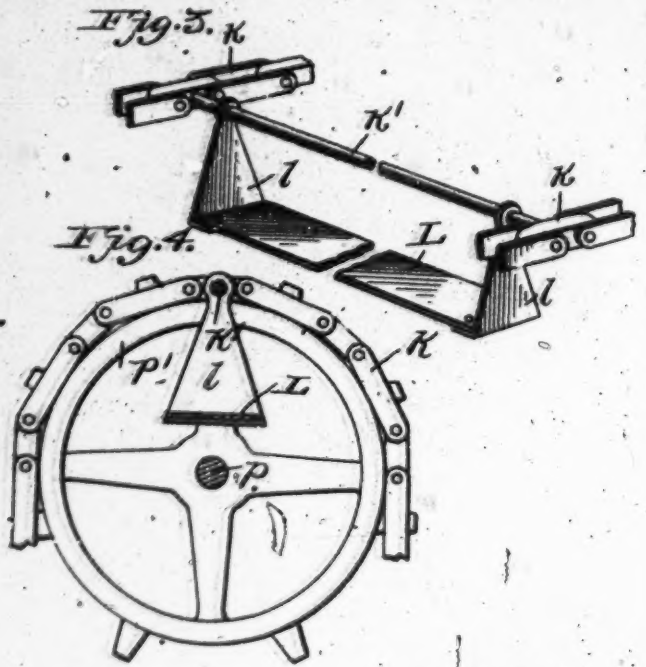
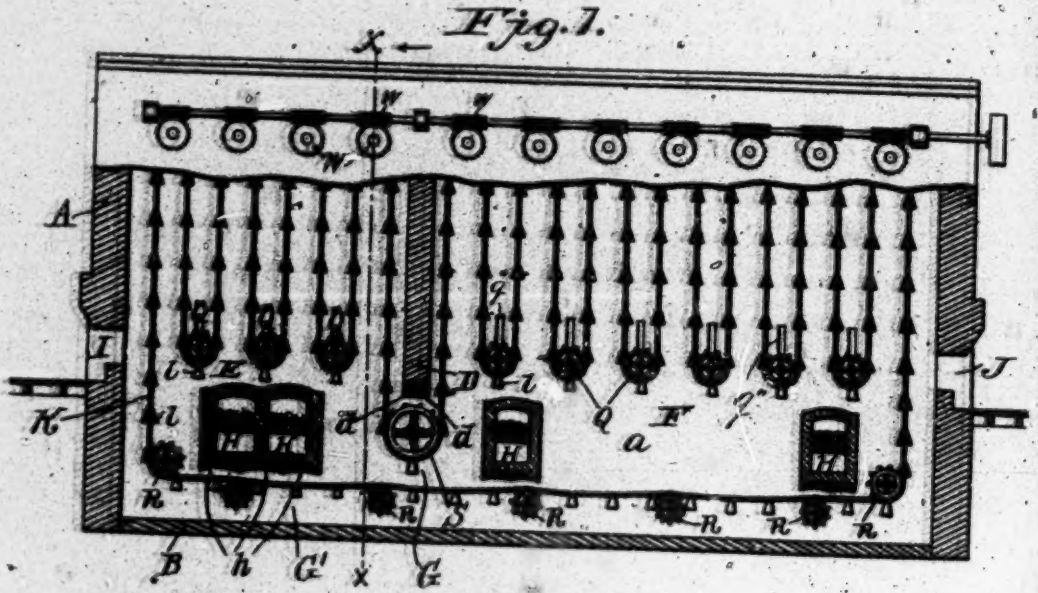
L. S. BURBANK.

Patented Oct. 29, 1901.

APPARATUS FOR COOKING AND DRYING.

(Application filed Dec. 21, 1898.)

(No Model.)



WITNESSES:

Edwin G. McKee,
J. M. Anderson

INVENTOR

Louis S. Burbank

BY

E. W. Anderson

his ATTORNEY.

UNITED STATES PATENT OFFICE.

LOUIS S. BURBANK, OF WORCESTER, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NATURAL FOOD COMPANY, OF NIAGARA FALLS, NEW YORK, A CORPORATION OF NEW YORK.

APPARATUS FOR COOKING AND DRYING.

SPECIFICATION forming part of Letters Patent No. 685,671, dated October 29, 1901.

Application filed December 21, 1899. Serial No. 741,072. (No model.)

To all whom it may concern:

Be it known that I, LOUIS S. BURBANK, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Cooking and Drying; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Figure 1 is a side elevation of my apparatus, partly broken away. Fig. 2 is a section on the line *x x*, Fig. 1. Fig. 3 is a detail perspective view of one of my carriages in connection with the sprocket-chain. Fig. 4 is a detail cross-sectional view of same in connection with the sprocket mechanism.

This invention has relation chiefly to means for cooking and drying food material in large quantities; and it consists, mainly, in the novel construction and combination of devices constituting a cooking and drying oven through which the material is passed in conveyers having vertical as well as horizontal continuous movement, as hereinafter set forth.

In the accompanying drawings, illustrating this invention, the letter *A* designates the wall of the oven, *B* the floor or base, and *C* the top, suitably supported by strong beams *c*. The parallel side walls *a a* are comparatively near together, being but a little more distant from each other than the length of the shafting and gearing and sufficiently close to afford bearings for the ends of the shafting beyond the gearing or sprocket-wheels which support the endless carrying chains to which the carriages or swinging shelves are connected. The length of the oven may be according to the requirement of the material and the height about four times the width, more or less.

D represents the partition between the baking-oven *E* and the drying-chamber *F*. This partition connects the side walls from the top *C* downward and terminates a few feet above the floor, being supported by strong iron beams *d* in such manner that there is provided a low passage-way or opening *G* below

the partition, forming the sole passage or communication between the baking and drying chambers of the oven.

H H indicate the heaters or furnaces, which are supported above the floor or base *B* by means of suitable girders and arches *h* in such manner that passages *G'* are provided between said heaters and the floor or base.

K represents a continuous carrying-belt composed of lateral sprocket-chains *k'* and shafts *k'*, which extend transversely between the sprocket-chains and are connected to links thereof. The arms of the carriages *L* hang on said shafts, always hanging vertically and serving to carry the baking shelves or pans *m*, which are connected to the flanged lower ends thereof.

P P represent the upper set of sprocket-pulleys, each consisting of a shaft *p* and end sprocket-wheels *p' p'*, secured thereon, said shaft being seated to turn in suitable bearings in the side wall near the top of the oven. The ends of these shafts which extend through the side wall are provided with worm-wheels *W*, which are operated by means of a worm-shaft *w* to provide a slow regular motion for the carrying-belt and at the same time to hold the sprocket-pulleys and the depending branches of said carrying-belt in proper position, so that no slipping of any portion of the chain in consequence of overweighting can occur.

Q Q indicate the lower set of sprocket-pulleys, each consisting of a shaft *q* and end sprocket-wheels *q'*. These lower sprocket-pulleys are designed to hang in the depending loops or bights of the carrying-chain *K*, which form vertical branches in passing over the pulleys *P* and under the pulleys *Q*. The sprocket-pulleys *Q* are steadied by the engagement of the ends of their shafts with guides *q''* in the opposite side walls. Automatic adjustment is in this manner provided for changes in the length of the shelves caused by variations in the temperature. While the sprocket-pulleys *P* are located near the top of the oven, both in the baking and in the drying compartments, the lower sprocket-pulleys *Q* are carried at a level a little above that of the tops of the heaters or furnaces.

R R represent the return sprocket-pulleys,

which are arranged in series a little above the main floor and serve to support and carry the chain of carriages back from the delivery end to the feed end of the oven. In the end walls I indicates the feed-opening, arranged at the proper height above the feed-floor, and J the delivery-opening.

S indicates a large sprocket-pulley located in the upper portion of the opening G below the partition D and spanning the same in such manner that the chain of carriages in passing from the baking-compartment E to the drying-compartment F will be carried around the lower end of the partition through said opening.

The heaters or furnaces of the smaller compartment E are sufficient in number or size to produce a high temperature for cooking the material, while those of the larger or drying compartment are designed to produce a much lower degree of heat. It is evident that the feed may be in either direction, so that the material may be first cooked and then dried or first dried and then cooked, and in some cases when a sharp browning is desired at the end of the process the partition may be placed around the delivery end and a baking heat applied. The carrying-chain is operated by suitable worm-gearing, as hereinbefore mentioned, and as its end branch in rising passes the feed-opening the pans of biscuit or other material are laid on the carriages, which convey them upward into the higher heated portion of the baking-compartment, then downward to near the tops of the furnaces, and again upward and downward, and so on until they are passed through the opening G under the partition D into the drying-compartment. Here they are again, through

successive elevations and depressions, moved slowly the length of the chamber, finally descending by the end branch of the conveying-chain near the delivery-opening in the end wall, through which the pans are unloaded, the chain continuing downward and back by the return-pulleys to the feed end to be again charged with pans of the food material.

It will be observed that the operation of this baking and drying oven is continuous, and it is so arranged that the preparatory work of forming the material in shape for baking and drying is entirely separated from that portion of the work which has to do with the cooling and packing for transportation.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

In an oven, the combination of a casing provided with guides, a vertical partition dividing the casing into a drying-chamber and a baking-chamber, said partition being spaced from the bottom of the casing, forming a passage, a series of sprockets in the upper part of the chamber, an endless chain carrying swinging shelves supported by said sprockets and looped within the chambers, a series of sprockets suspended within said loops and operating in said guides, and a plurality of furnaces situated within the lower part of said chambers, the lower part of the endless chain passing below said furnaces, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS S. BURBANK.

Witnesses:

ALBERT H. CHAFFEE,
J. R. GILKESON.

No. 713,795.

Patented Nov. 18, 1902.

H. D. PERKY.

FILAMENTOUS CRACKER.

Application filed Sept. 20, 1900; Renewed Apr. 16, 1902.

(No Model.)

FIG. 1

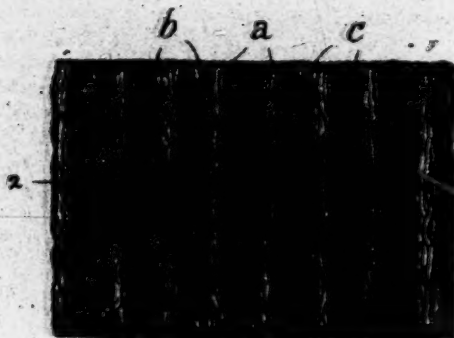


FIG. 2

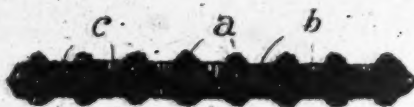
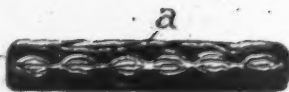


FIG. 3



Henry D. Perky

Inventor

by

E. W. Anderson

his

Attorney

Witnesses

George M. Anderson

Wm. M. Mc Carthy

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE
NATURAL FOOD COMPANY, OF NIAGARA FALLS, NEW YORK, A COR-
PORATION OF NEW YORK.

FILAMENTOUS CRACKER.

SPECIFICATION forming part of Letters Patent No. 713,795, dated November 18, 1902.

Application filed September 29, 1900. Renewed April 18, 1902. Serial No. 103,213. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have made a certain new and useful invention in Crackers; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a plan view of the cracker. Fig. 2 is a section on the line 2-2, Fig. 1. Fig. 3 is an end view of the cracker.

The object of the invention is to provide a cracker of filamentous or shredded wheat or other grain; and the invention consists in the novel formation of the cracker, whereby it is given compact and definite shape, while the fibrous or light structure is preserved with sufficient strength for use as an article of food of the character indicated.

In baking biscuits of wheat filaments it has been found that there is a tendency for the biscuit to become loose or somewhat open in its middle portion, owing to the swelling in the baking, and such loose structure is not suitable for the flattened or cracker form. It has also been found that when the material is compressed by a mashing action its filamentous structure, upon which depends its light and porous character, is injured. In order to remedy these conditions and provide a cracker of suitable structure, the article is made in sufficiently thin and flattened form of the filaments which extend in a more or less undulating manner in one direction, superficial ribs being provided extending in the direction of the filaments and between these ribs elongated depressions having in their bottoms locking indentations. To effect this, the filamentous material having its fibers or filaments extending in one direction is laid between baking-irons having teeth studding their inside surfaces in such manner that while the filamentous material is held between the irons during the baking by the approximation of the points of the teeth the fila-

mentous structure is preserved, the pressure between the points being sufficient to cause the locking of the filaments by direct attachment to each other at regular intervals, so that the cracker will hold its form. In this structure it will be readily seen that as the material is distributed with its fibers extending in a more or less undulating manner in one direction the intervals between the teeth of the baking-irons will permit the filaments to extend therein in such a way that the cracker will be provided with superficial ribs *a*, extending in the direction of the filaments. Between these ribs the cracker will be provided with elongated or channel-form depressions *b*, in the bottoms of which are series of pointed or somewhat-pointed indentations *c*, which are caused by the pressure of the points of the teeth of the baking-irons. These indentations are distributed throughout the cracker and show the only places where the material is compressed with any degree of force, the general filamentous structure remaining inviolate, but presenting a close arrangement, which while it does not entirely eliminate the interstices between the filaments as actual compression would nevertheless reduce the interstices sufficiently to give the article the flattened or cracker character designed. At the same time the short binding filaments made between the attachment-points in series have more strength to sustain the form of the article than if they extended loosely across its entire breadth. The baking-iron whereby this cracker is prepared is shown in my pending application, Serial No. 24,905, series of 1900. These irons are studded on their inside surfaces with beveled teeth, which when the irons of a set or pair are placed together approximate contact with each other at their points only. The arrangement of teeth is preferably regular, as indicated, and the teeth are made long enough to provide sufficient depth in the intervals between them to avoid mashing the filamentous material, which is thus enabled to preserve its normal light character, the binding being effected at the locking indentations by the approximate contact of the points of the teeth.

Having described this invention, what I

claim, and desire to secure by Letters Patent,
is—

A cracker composed of superposed filaments of grain, which are locked together at a series of points at short distances apart by utilizing the adhesive nature of the material at such points, while leaving the filaments comparatively free from one locking-point to another in such manner as to provide an open struc-

ture of even nature on both sides of the article.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

MAUD Y. ANDERSON,
BERTHA E. SUTTON.

No. 746,145.

PATENTED DEC. 8, 1903.

H. D. PERKY.

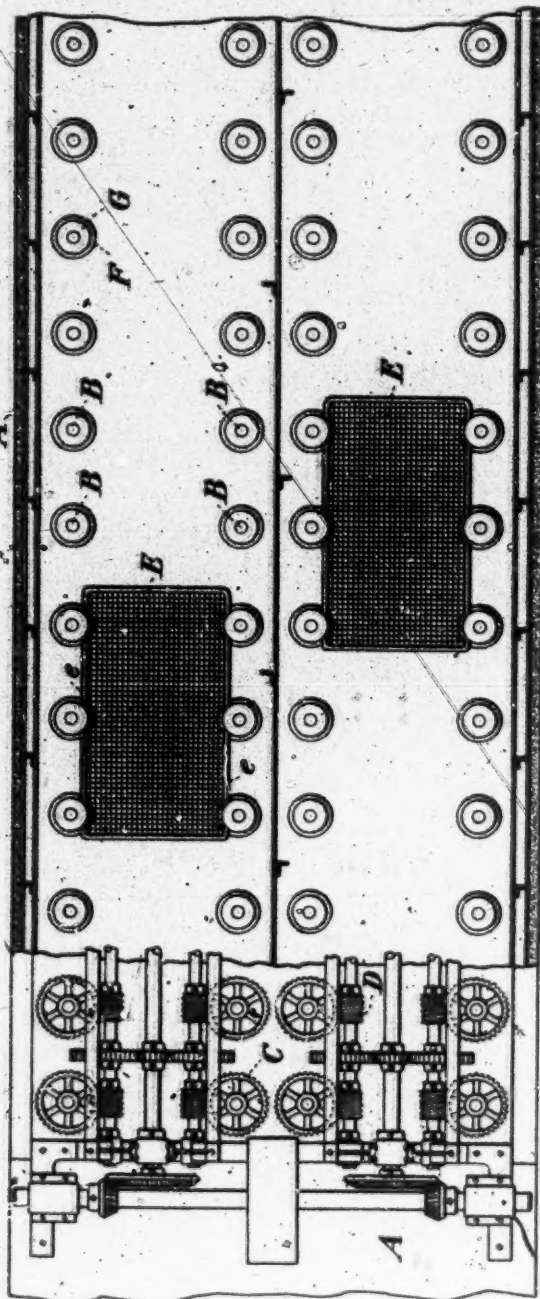
CONTINUOUS MOTION HEATING AND EVAPORATING APPARATUS.

APPLICATION FILED MAR. 5, 1901.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1



Witnesses

C. A. Hosmer.
E. O. Bennett.

Inventor

Henry D. Perky
 by *E. W. Anderson*
 his Attorney.

No. 746,145.

PATENTED DEC. 8, 1903.

H. D. PERKY.

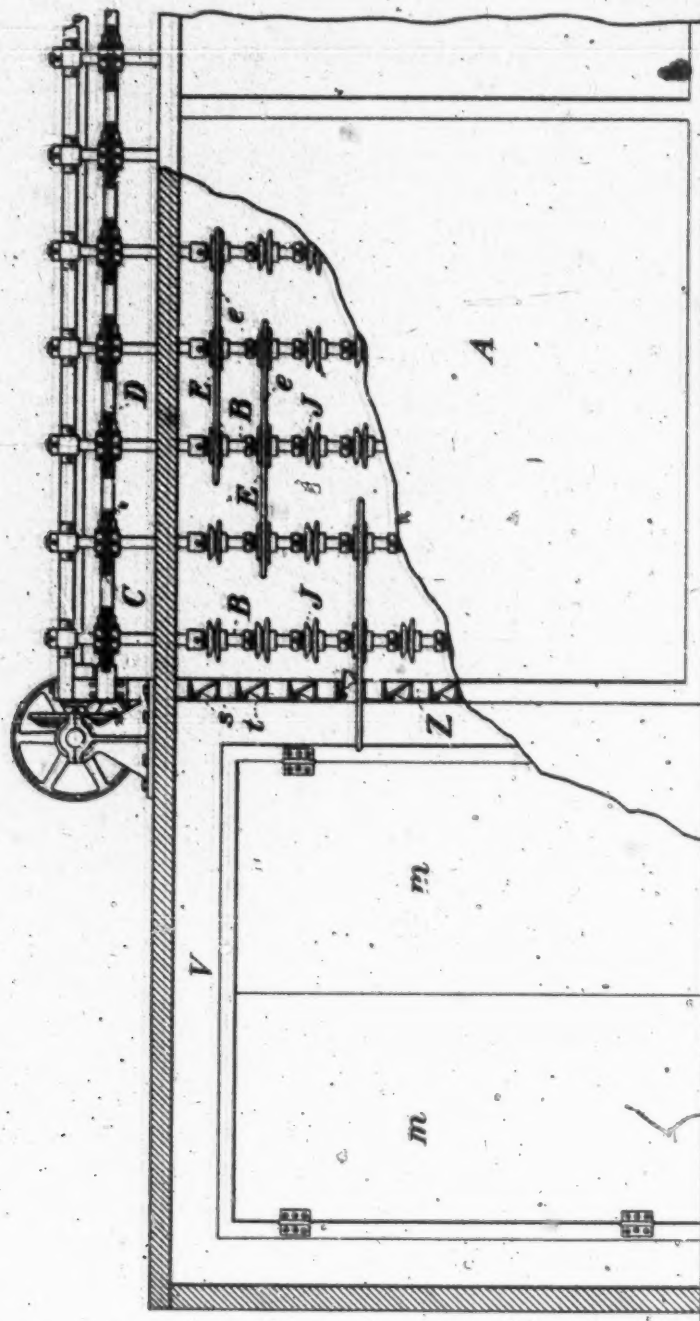
CONTINUOUS MOTION HEATING AND EVAPORATING APPARATUS.

APPLICATION FILED MAR. 5, 1901.

NO MODEL.

3 SHEETS—SHEET 2.

Fig. 2



Witnesses

L. H. Hosmer
E. O'Connell

Inventor

Henry D. Perky

By E. W. Anderson
his Attorney

No. 746,145.

PATENTED DEC. 8, 1903.

H. D. PERKY.

CONTINUOUS MOTION HEATING AND EVAPORATING APPARATUS.

APPLICATION FILED MAR. 5, 1901.

NO MODEL.

3 SHEETS—SHEET 3.

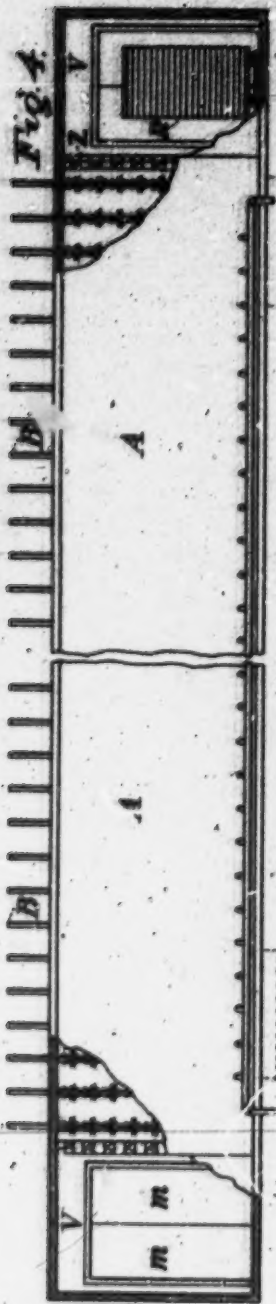


Fig. 5



Fig. 3

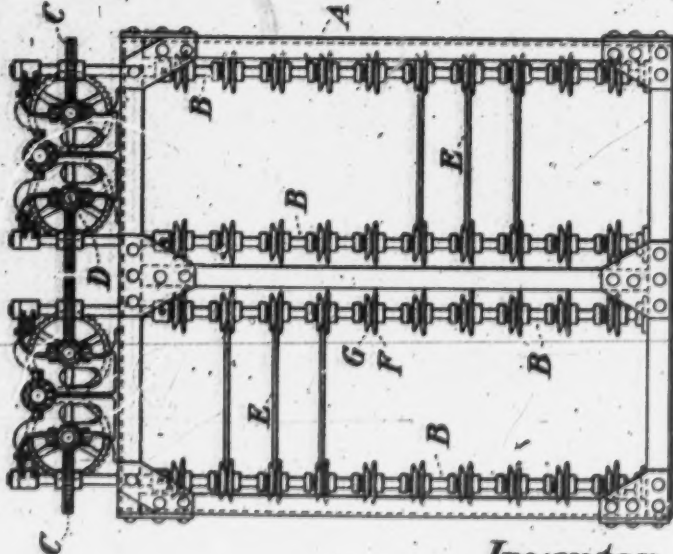


Fig. 6

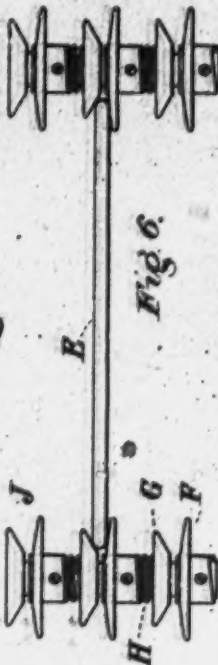


Fig. 7



Witnesses

S. H. Hosmer.
E. O. Connell

Inventor

Henry D. Perky

by E. W. Anderson

his Attorney

UNITED STATES PATENT OFFICE.

HENRY D. PERKY, OF NIAGARA FALLS, NEW YORK, ASSIGNOR TO THE
NATURAL FOOD COMPANY, OF NIAGARA FALLS, NEW YORK, A COR-
PORATION OF NEW YORK.

CONTINUOUS-MOTION HEATING AND EVAPORATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 748,145, dated December 8, 1908.

Application filed March 6, 1901. Serial No. 49,883. (No model.)

To all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Niagara Falls, in the county of Niagara and State of New York, have made a certain new and useful invention in Continuous-Motion Heating and Evaporating Apparatus; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a plan view, partly broken away to show the interior mechanism. Fig. 2 is a side view, partly broken away to show the interior mechanism. Fig. 3 is an end view of the casing and mechanism, the end wall of the casing being removed. Fig. 4 is a side view, partly broken away, showing vestibules at the ends of the casing. Figs. 5, 6, and 7 represent details of the mechanism.

The invention has relation to means for heating or evaporating food products and other articles; and it consists in the novel construction and combinations of parts, as hereinafter set forth.

In the accompanying drawings the letter A designates the wall or incasement of the heating or drying chamber, which may be provided with steam-pipes or other ordinary means for effecting a temperature of the degree desired. In this chamber are arranged along its length parallel series of vertical shafts B B, the shafts of each series being placed opposite to each other, two and two, as indicated by the drawings. Each shaft is provided with a worm-wheel C, which is rigidly secured thereto and serves when operated by a suitable worm-shaft D, extending horizontally along the series, to cause a slow rotary motion. Usually a worm-shaft is provided for each line of vertical shafts B B, these being so constructed and arranged that all the vertical shafts will be turned at the

same rate of speed, but in opposite directions, in each row or line from those in the next row or line. Instead of worm-gearing other means may be employed to turn the vertical shafts; but the worm-gearing is preferred.

E E represent plane pans or trays having their lateral edges e e parallel and of sufficient thickness to afford purchase to the rotary grips or edge bearings J of the vertical shafts. All the pans or trays are of similar width, as they are designed to pass between the parallel rows of vertical shafts. These parallel-edge pans or trays are designed to have wire-cloth or perforated bottoms extending in the plane of their parallel edges and in the plane of their respective edge bearings.

As usually constructed, on each shaft B is rigidly secured a circular flange or disk F, the upper surface of which is convex or in the form of an inverted sancer, and above this convex flange is provided on the same shaft a movable convex flange G, which, however, has its convexity downward in such wise that the convexities of the two flanges are toward each other. As usually arranged the convex surfaces of these flanges F and G are in contact at their central portions, or a thin washer may be placed between them. The upper flange G of each set is elastically pressed toward the lower or fixed flange by means of a spring, (indicated at H.) In this manner each shaft is provided with a rotary guide and vertical-pressure grip of elastic character adapted to engage the purchase edge e of the pan or tray, hereinbefore referred to. Means of adjustment are usually provided for the spring, as indicated at K, whereby the force of the grip may be regulated in accordance with the requirements of the work. There may be several grip devices or edge bearings of like character on each shaft at different levels; but whatever be the number all the other shafts must have their grip devices on the same level or levels. The distance between any two shafts or grips in succession must be less than the length of

a pan or tray and usually less than half its length unless auxiliary guides are provided to keep the trays in line with the grips, it being designed that before the engagement of a tray with one set of grips is terminated said tray shall in its forward movement become engaged with the next set of grips.

The worm shafts are geared to give continuous rotary motion in opposite directions to the parallel rows of vertical shafts, so that the pans or trays will be carried along between them by the bearings in the same direction and in a continuous manner. The movement is designed to be slow in order to avoid great length of heating-chamber, as the drying or cooking operation must be completed when the tray arrives at the discharge end of the incaseiment. The action being continuous there is no waste of time in stopping for feeding or for the discharge.

At one end of the casing is usually provided a vestibule V, wherein communication is had with the feed end of the series of carrying devices, and in this vestibule is carried on the operation of feeding the charged pans or trays to the evaporator or baker, which is effected by passing them into engagement with the grips or edge bearings of the end shafts of the series. At the other end of the casing a similar vestibule is provided for the operator who takes the trays from the grips of this end after they have passed through the drying-chamber. Sometimes the vestibules may be dispensed with.

In the end walls of the heating-chamber or in the partitions Z are arranged slots or openings just sufficient for the passage of the trays and the articles thereon. The vestibules may be provided at their sides or outer ends with doors m in order to economize heat as much as possible. The charged trays may be loaded on racks R, and such racks may also be used in the discharging operation, the object being to avoid frequent openings of the vestibule-doors. In each slot s is usually provided a swinging shutter t, having lateral cam-flanges which are engaged by the edges of the pan and serve to open the shutter and hold it open until the pan of biscuit has passed through the slot. The shutters are thus opened and closed automatically and serve to prevent loss of heat from the closure.

The edge bearings of the vertical shafts are arranged in vertical series or in tiers, one above another, providing for moving tiers of pans, so that there is great economy of space in the apparatus.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In heating apparatus, the parallel series of vertical shafts arranged in pairs, a vertical series of vertical-pressure grip devices arranged in pairs on said shafts, horizontal shafts extending along the series of vertical shafts, and the engagement-gearing of said horizontal shafts and vertical shafts, substantially as specified.

2. The combination with a heating or drying closure, of parallel series of vertical-pressure-spring grip devices, or edge bearings, oppositely placed in pairs and in tiers, one above another, and means for rotating said parallel series in opposite directions, substantially as specified.

3. The combination with a heating or drying closure, of parallel series of vertical shafts, the tiers of pairs of convex flanges secured thereto, the movable convex flanges thereon, the pressure-springs of the movable flanges, and the gearing arranged to turn the parallel series in opposite directions, substantially as specified.

4. The combination with a heating or drying closure, of parallel shafts, the moving edge bearings connected thereto, the gearing for turning the shafts, the parallel-edged pans or trays, and the automatic shutters of said closure, substantially as specified.

5. The combination with a heating or drying incaseiment, and closing devices at its end openings, of parallel series of tiers of pairs of moving vertical-pressure grip devices, or edge bearings, means for rotating said parallel series in opposite directions, and parallel-edge plane perforated trays or pans adapted to engage said grip devices, substantially as specified.

6. In an oven or closure, the combination with the parallel-edge pans or trays of a plurality of series of vertical rotating shafts, tiers of pairs of opposite edge bearings on said shafts, spring devices to close said bearings on the edges of the pans or trays, gearing for turning said shafts, and automatically-closing devices for the feed and discharge ends of said oven or closure, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

LEWIS C. MUZZY,
GEORGE H. HOSMER.

L. S. BURBANK.
MACHINE FOR MAKING CARTONS OR FOLDING BOXES.

APPLICATION FILED DEC. 21, 1899.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1.



Fig. 10.

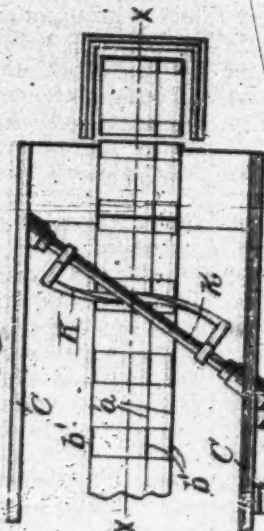


Fig. 11.

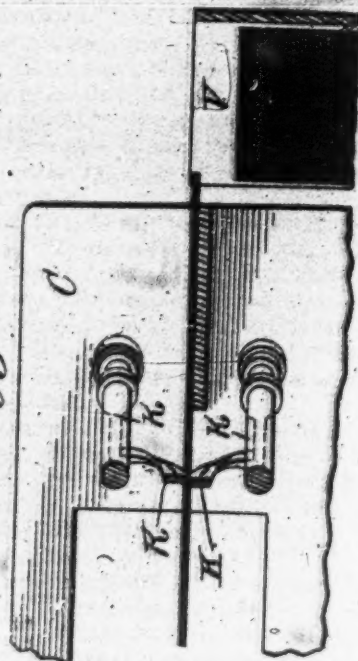
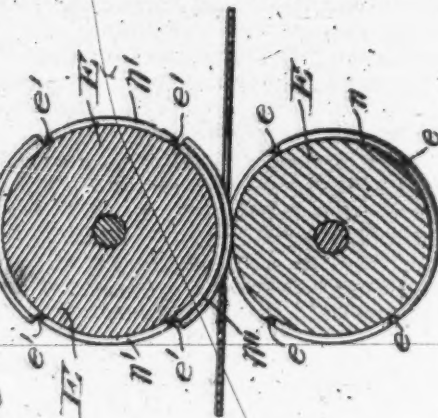


Fig. 12.



Fig. 13.



WITNESSES:

E. J. McHew.
G. M. Anderson

INVENTOR

Louis S. Burbank

BY

E. W. Anderson
his ATTORNEY.

L. S. BURBANK.
MACHINE FOR MAKING CARTONS OR FOLDING BOXES.

APPLICATION FILED DEC. 21, 1899.

NO MODEL.

3 SHEETS—SHEET 2.

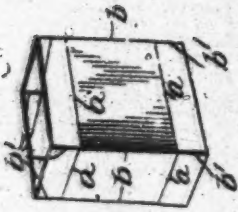


Fig. 14.

Fig. 13.

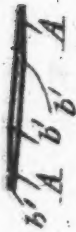


Fig. 15.

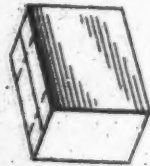
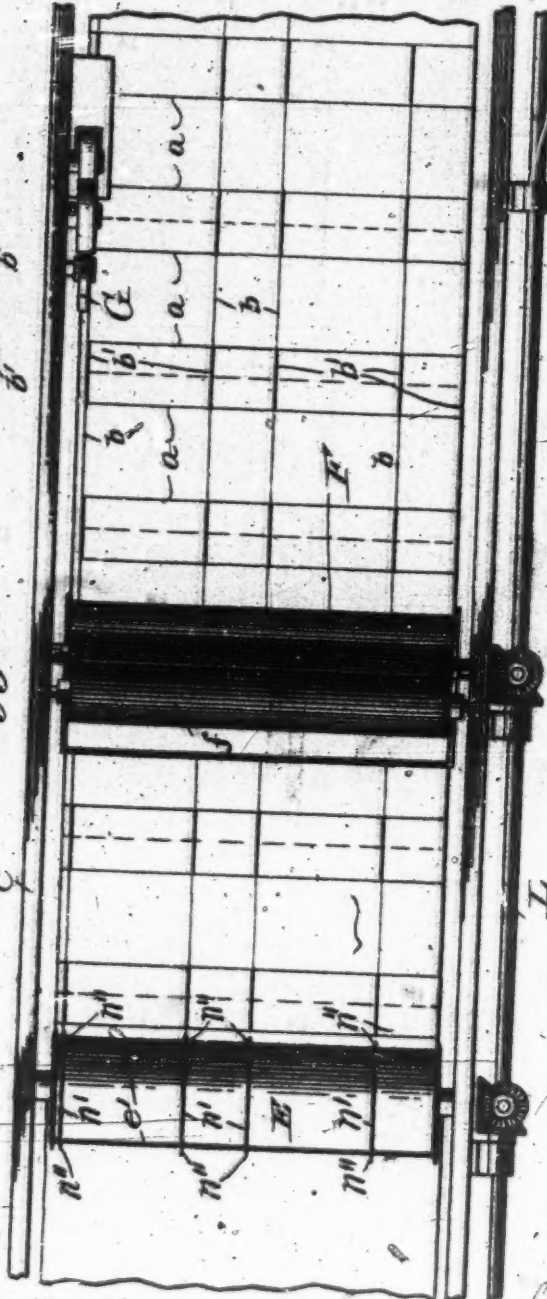


Fig. 15.



WITNESSES:

E. L. McKee.
H. M. Anderson

INVENTOR

Louis S. Burbank

BY

E. W. Anderson

his ATTORNEY.

No. 770,159.

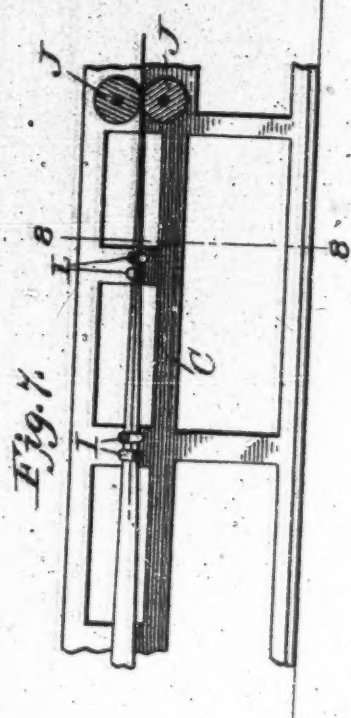
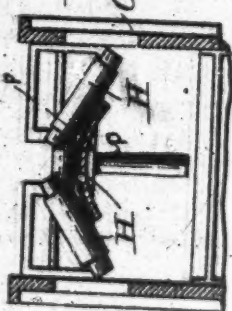
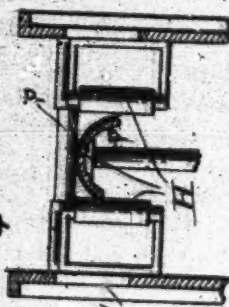
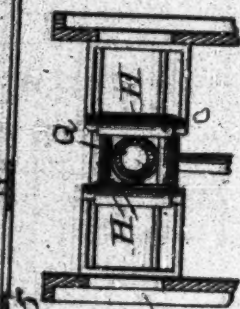
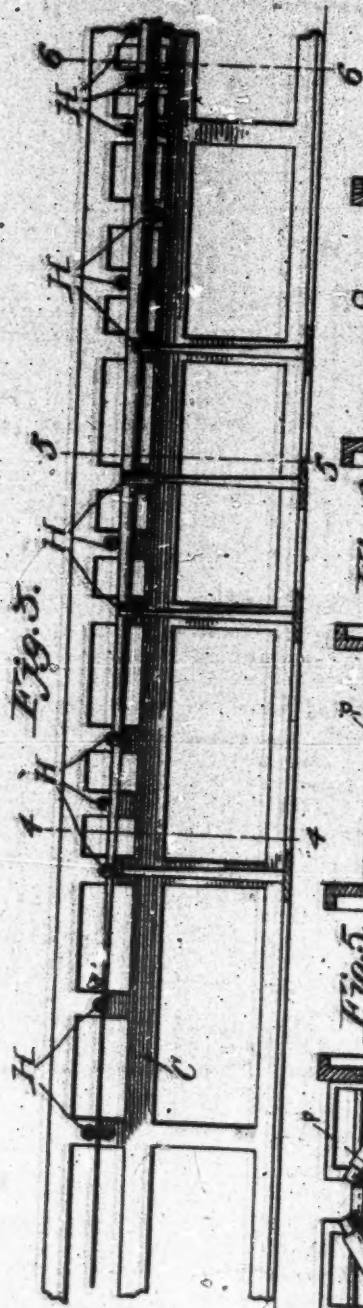
PATENTED SEPT. 13, 1904.

L. S. BURBANK.
MACHINE FOR MAKING CARTONS OR FOLDING BOXES.

APPLICATION FILED DEC. 21, 1899.

NO MODEL.

3 SHEETS—SHEET 1.



WITNESSES:

E. J. Mether.
G. M. Anderson.

Fig. 4.

INVENTOR.

Louis S. Burbank.

BY

E. W. Anderson

ATTORNEY.

UNITED STATES PATENT OFFICE.

LOUIS S. BURBANK, OF WORCESTER, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NATURAL FOOD COMPANY, OF NIAGARA FALLS, NEW YORK, A CORPORATION OF NEW YORK.

MACHINE FOR MAKING CARTONS OR FOLDING BOXES.

SPECIFICATION forming part of Letters Patent No. 770,159, dated September 13, 1904.

Application filed December 21, 1890. Serial No. 741,074. (No model.)

To all whom it may concern:

Be it known that I, LOUIS S. BURBANK, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Machines for Making Cartons or Folding Boxes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In the accompanying drawings, Figure 1 is a side elevation of my machine, partly broken away. Fig. 2 is a partial plan view of same on an enlarged scale. Fig. 3 is a partial vertical longitudinal section of the machine, illustrating the guiding-rollers. Figs. 4, 5, and 6 are sectional views illustrating successive steps in the folding of the paper. Figs. 7 and 8 are detail views illustrating the operation of the creasing-rollers. Fig. 9 is a detail sectional view of the cutting and scoring rollers. Figs. 10 and 11 are detail views illustrating the operation of the cutter. Fig. 12 is an end view of the cutter, and Figs. 13, 14, and 15 are detail views of the finished carton.

This invention has relation to a machine for making cartons or folding boxes of paper; and it consists in the novel construction and combinations of devices, as hereinafter explained.

The object of the invention is to provide such folding cartons economically and in large quantities mainly for the use of factories and other sources of supply wherein the cartons are needed for casing the goods manufactured.

The folding carton made by this machine is rectangular and of doubled flat formation, its upper and lower portions or doublings being in contact with each other, as indicated at A in the drawings. Scorings are represented at *a* and *b* at right angles with each other and edge-slits *c* in line with the scorings *b*. The frame C of the machine is of elongated form and is provided with proper mountings for seating the journals of the mechanism and other special parts.

D represents bearings at the end of the ma-

chine for the axis-piece of the supply-roll *d* of paper.

EE designate the scoring-rolls, which should also be provided with edge-knives for trimming the edges of the paper which passes from the supply-roll between said scoring-rolls.

FF represent the printing-rolls.

G indicates a disk whereby a line of glue or paste is applied along one edge of the sheet of paper.

HH indicate a number of sets of edge guiding or folding rolls, whereby the edges of the sheet of paper are gradually guided upward around, and over toward each other until one edge overlaps the other, the sheet then having the form of a cylinder or sleeve. The overlapping edge portion of the sheet is provided with the line of glue.

In this machine the paper is bent over rounded guides PP, which are secured to the frame and are arranged along the median line, their curved bearing-surfaces *p* presenting upward, preferably in order that the weight of the lateral portions of the strip of paper may assist in the bending. The guides PP are supplemented by the opposite isoclinal folding-rolls HH above referred to, which being arranged along the length of the strip in series with their axis, having gradually-increasing angular relation to the horizontal, gradually turn its edge portions around under the middle portion until it assumes tubular form, when it is supported by a shaping-mandrel Q, which fills out the tube, giving it a true cylinder form.

J represents the pressing-rolls, whereby the cylinder or sleeve is pressed flat to effect the adherence of the edge portions and to bring the doublings in contact.

KK designate the rotary knives, whereby the flattened sleeve is cut into sections, each of which is designed to be a complete folding carton.

The various rolls and moving parts may be operated by means of a longitudinal shaft L, having proper gear connections. The scoring-rolls are provided with corresponding

transverse indentations *e* and fine ribs *e'*, which extend between the edge-trimming cutters *m*. These rolls are also provided with the corresponding circumferential indentations *n* and fine ribs *n'*, alternating with short cutters *n''*, also extending circumferentially in such manner that in their work upon the sheet the longitudinal scorings alternate with the slits in the same lines, or the indentations may be omitted, as the ribs will score on a plain roll sufficiently well. The upper printing-roll *F* is provided with a circumferential type-face to receive ink from the small rollers of the inking apparatus *f*, and as the sheet of paper passes between the rollers *F* and *F'* the printed matter which is designed for the cartons is placed thereon. That portion of the machine along which the folding is effected through the medium of the guiding-rolls *H* is of considerable length, in order to provide a very gradual bending during the operation, this bending being such that when the edges of the sheet are brought to the lapping position their variation from parallelism will be inconsiderable. The long folding mechanism also allows time for the printing to dry. In order to insure the drying, however, a hot-air incasement may be provided over a portion of the folding mechanism. The disk *G*, whereby the line of glue or paste is applied to the edge portion of the sheet, may be located in any convenient position. If a drying-incasement is provided over the folding mechanism, it should be located beyond the incasement near the pressing-rolls *J*. Lateral creasing-rolls *I* are arranged to engage the sides of the sheet at its bent or sleeve-form portion where it approaches the pressing-rolls *J*, said creasing-rolls serving to partially flatten the tube formed by the mandrel *Q* and its supplementary rollers and start the angular bends and at the same time guiding it in the proper direction between the pressing-rolls. By these rolls the sleeve is pressed flat and the edges of the sheet are secured together along the lapped portion. As the flat sleeve portion passes along from the pressing-rolls it is subdivided into sections of cartons by the rotary spiral shearing-knives *K K*, the cuts being made transversely and through the

middle points of the longitudinal slits of the sheet. The shafts *k* of the knives are horizontal and parallel to each other and extend transversely but somewhat obliquely over and under the work, and the edges of the cutting-blades are of corresponding spiral formation, adapting them to effect a straight shear at right angles to the line of feed and while the sleeve is in motion. The successive points of the spiral cutting edges as they come together in making the section are in exact transverse position. The cutters are mounted on oblique shafts, in order that the tendency of their spiral formation to move the work laterally askew will be corrected. The cutter-blades are set with their cutting edges presenting radially outward and are designed to act radially upon the work between them. The sections or cartons as they are cut off may be stacked at *V*.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. In a machine for making cartons, the combination with scoring, trimming and tubeforming rolls, of pressing-rolls, a lower rotary shaft oblique to the line of feed, an upper rotary shaft parallel to said lower rotary shaft, and corresponding oppositely-inclined spiral blades on these shafts, adapted to effect a straight shear cut at right angles to the line of feed, substantially as specified.

2. In a machine for making cartons from a continuous strip of paper, the combination with scoring and trimming rolls, and pasting devices at one end, of pressing-rolls, oblique shafts and their oppositely-inclined spiral cutters at the other end, and below the pasting devices and pressing-rolls, supports for the middle portion of the strip of paper, and opposite isoclinal guide-rolls, whereby it is bent downward, folded under in tubular form, creased, pressed, and cut off in sections, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS S. BURBANK.

Witnesses:

ALBERT H. CHAFFEE,
J. R. GILKINSON.

No. 785,554.

PATENTED MAR 21, 1906.

R. HÖRNER.
APPARATUS FOR CONDITIONING GRAIN, &c.
APPLICATION FILED JUNE 7, 1904.

4 SHEETS—SHEET 1.

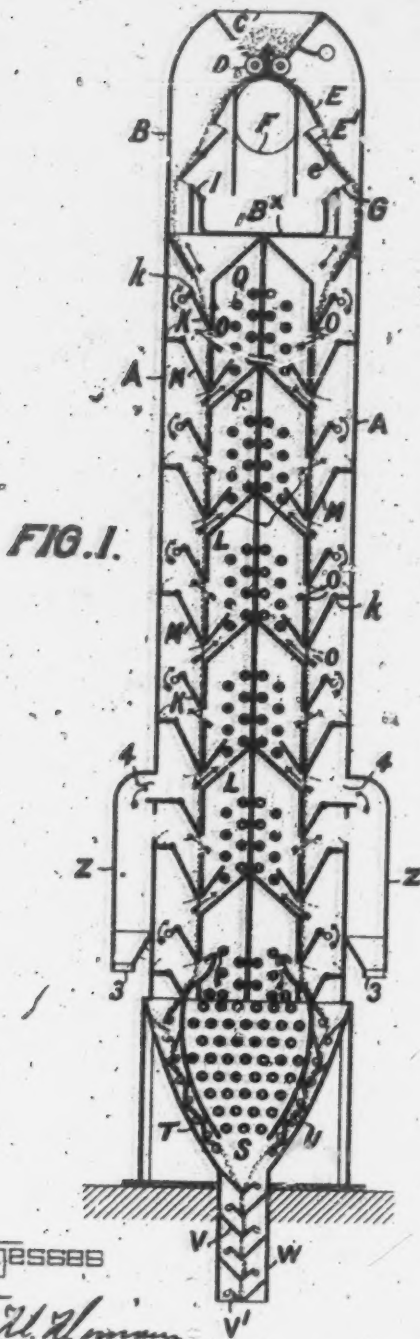


FIG. 1.

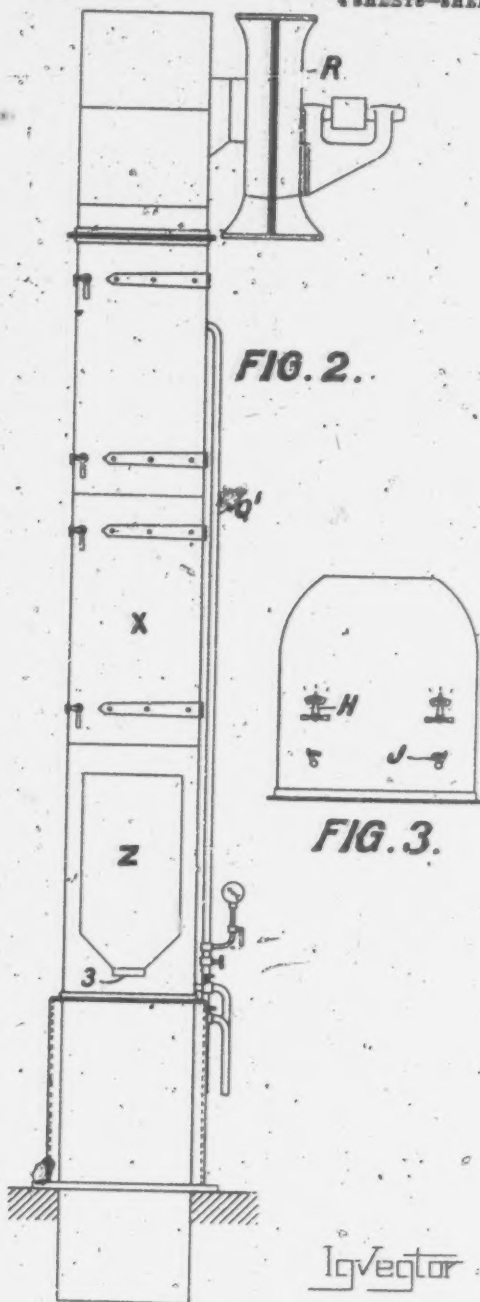


FIG. 2.



FIG. 3.

Witnesses

J. H. Hornum
William J. Smith.

Inventor

Richard Hörner
by Henry C. Cunniff
Attorney

No. 785,554.

PATENTED MAR. 21, 1905.

R. HORNER.

APPARATUS FOR CONDITIONING GRAIN, &c.

APPLICATION FILED JUNE 7, 1904.

4 SHEETS—SHEET 1.

FIG. 4.

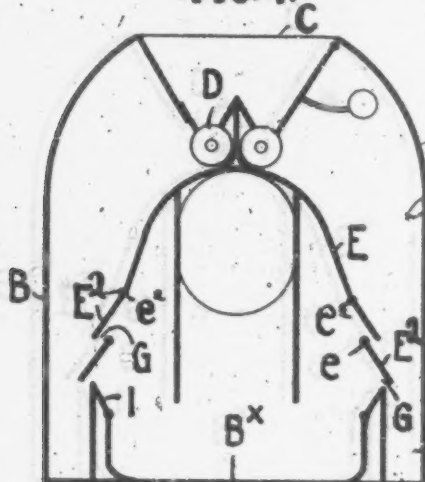
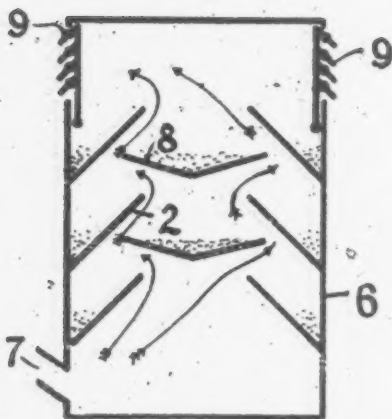


FIG. 5.



Witnesses

J. L. Almon
William J. Firth

Inventor

Richard Horner
by Henry Comins
Attorney

No. 785,554.

PATENTED MAR. 21, 1905.

R. HORNER.

APPARATUS FOR CONDITIONING GRAIN, &c.

APPLICATION FILED JUNE 7, 1904.

4 SHEETS—SHEET 3.

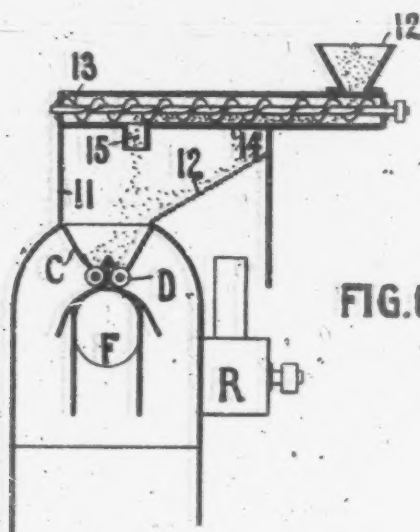


FIG. 6.

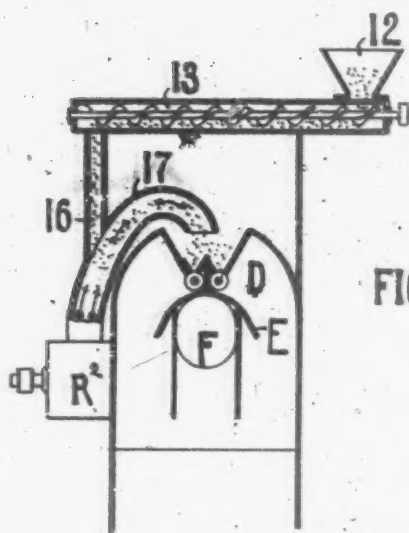


FIG. 7.

Witnesses

J. H. Almon
William J. Firth

Inventor

Richard Horner
by Henry Connors
Attorney

No. 785,554.

PATENTED MAR. 21, 1905.

R. HORNER.

APPARATUS FOR CONDITIONING GRAIN, &c.

APPLICATION FILED JUNE 7, 1904.

4 SHEETS—SHEET 4.

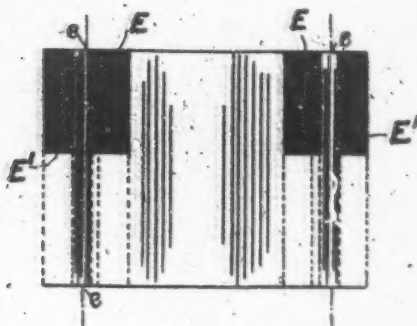
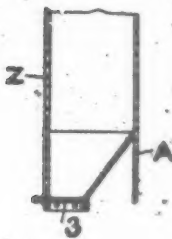


FIG. 8.

FIG. 9.



Witnesses

J. M. Union
William J. Firth

Inventor:

Richard Horner
 By his Attorney
Henry Conner

UNITED STATES PATENT OFFICE.

RICHARD HORNER, OF YORK, ENGLAND.

APPARATUS FOR CONDITIONING GRAIN, &c.

SPECIFICATION forming part of Letters Patent No. 785,554, dated March 21, 1905.

Application filed June 7, 1904. Serial No. 211,559.

To all whom it may concern:

Be it known that I, RICHARD HORNER, miller, a subject of the King of Great Britain, and a resident of Heworth, York, in the county of York, England, (whose post-office address is Woodbine House, Heworth, York, aforesaid,) have invented certain new and useful Improvements in and in Apparatus for Conditioning Grain and other Granular Material, (for which application has been made in Great Britain, No. 3,872, dated 18th day of February, 1903,) of which the following is a specification.

This invention relates to apparatus for drying and conditioning grain, beans, oats, and other granular material. It is adapted to take the place of the usual whizzer.

The invention will be understood from the following description, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section of my apparatus; Fig. 2, a side elevation; Fig. 3, a front elevation of the receiving-chamber; Fig. 4, a vertical section of the receiving-chamber, showing a slight modification in the valves or combs; Fig. 5, an enlarged sectional view of the second dust-chamber; Figs. 6 and 7, detail views of accessories to utilize the hot air. Fig. 8 is a plan view of the grids seen on a small scale in Fig. 1. Fig. 9 is a sectional detail view, on a relatively large scale, of a dust-collector and the door at the bottom thereof.

In carrying the invention into effect I provide vertical casings or trunks A, arranged upright in a straight line at opposite sides of a middle upright chamber L, down which trunks the material to be dried flows and up which a current of air for drying the material is caused to ascend by the suction-fan R. This air-current is heated by the hot-water or steam pipes S and again reheated at intervals by the pipes Q. At the top of the trunks A is a receiving-chamber B, fitted with a hopper C and feed-rollers D, and below this hopper C in the receiving-chamber B there are at each side a series of combs or grids E E', so arranged that as the wet grain passes over the combs they permit the water, assisted by the upward current of air, to drain from the produce and drain off into the tank B^x, from whence it is

discharged by a pipe. Some of the combs—viz., E'—are hinged or pivoted at e, so that they form valves and can be set to different angles relatively to the other combs, and when so set an opening G is left between them and the adjacent stationary parts, through which openings the air-current is drawn by the exhaust-fan. The air-current, in fact, is drawn in an opposite direction to the thin stream of descending produce as it falls over the combs E E', and the air is forced to pass through this thin descending stream and through the combs, also through the openings aforesaid, thus drawing off the water from the grain. The combs, however, can be so set that they are closed against the adjacent fixed parts, in which case the only exit for the air-current is actually through the combs themselves. Outside indexes H can be employed, so as to indicate the exact angle to which the adjustable combs are set, and thus the opening can be regulated to a nicety or closed altogether. Valves I are also provided in the receiving-chamber for regulating the outlet or discharge of air. When these are closed, the entire air-current finds its exit at the combs. By opening these valves I, however, part is drawn out (through the descending stream of produce) direct to the fan without passing through the combs at all. Thus these valves I allow air that is not required to pass through the combs E E' to be passed direct to the fan.

J represents outside indexes for the valves I.

The hinged combs may be as shown in Fig. 4, in which two combs E^x are provided, hinged at e^x, instead of a single valve hinged at middle.

The trunks A, to which the wheat passes when delivered thereto by the receiving-chamber B, are provided at intervals throughout their length with valves K M. These can each consist of a hinged plate sloping downward from the hinge k toward the inside walls of the trunk A and are so arranged as to check the rush of wheat and allow of only a thin stream of grain flowing through between the edge of the plate and the inner wall of the trunk. They also enable the rate of descent being regulated to a nicety. The inside wall of the trunk immediately below each au-

automatic valve is provided with holes or passages O, leading to the middle upright chamber L, and each alternate valve M in the trunk A forms a partition which divides the trunk A into a series of chambers and prevents the air passing straight upward. The middle chamber L is also divided up into compartments by partitions P. The air is therefore forced to pass in a circuitous course from the trunk A through these holes O and the descending stream of produce into the middle chamber L, and from thence out through the succeeding holes O and descending stream of produce again into the trunk A, and so on, thus causing the air to take a very devious course back and forth through the wheat, and this passing of the air through the stream of produce is repeated again and again before the air finally reaches the receiving-chamber B at the top of the apparatus. The air is reheated in the middle chamber L after each passage through the cold and wet wheat as it travels up the machine, for which purpose heating-pipes Q are fitted therein. This reheats the air after each contact with the wheat and also converts any remaining water quickly into steam, which steam is immediately drawn off by the fan. There is also provided means for collecting and drawing off any chaff or dust which may accumulate without interfering with the proper working of the machine in any way—namely, a dust-collector Z and a second dust-collector 6. The former comprises chambers Z, located near the bottom of the machine. The upward air-current enters the upper part of this chamber and leaves it at 4, depositing the dust, however, in the chamber and allowing it to fall into the bottom thereof, from whence it can be removed from time to time as required through the doors 3. These doors are shown in detail in Fig. 9. The other dust-collector, 6, is located near the fan R and will be hereinafter described.

The pipe Q in the heating-chambers L is supplied with steam by the pipe Q', which is fitted with a steam-gate 5.

At the bottom of the apparatus are the heating, cooling, and discharging appliances. The heating appliance consists of passages T, one at each side of the main heating apparatus S, which latter heats the air-supply and supplies heat to the heater in the middle chamber L. These passages are fitted with a series of chutes or plates U, which are highly heated by the main heating apparatus, whereby a very high temperature is imparted to the wheat, if required, there being no circulation of air through these side passages T. The two passages converge toward a single passage W below the main heating apparatus S, through which the cold-air supply is drawn. A series of chutes or baffles V are placed in the passage W, which allow the cold air to play upon it, and thus chill it down after be-

ing highly heated as it is being discharged. The baffles V are hinged, so as to enable the size of the orifice between them and the edges of V to be regulated, and the air passes back and forth through the material as it descends in a thin stream. The heat abstracted from the produce in the cooling appliance V is taken up by the air, thus slightly heating it before entering the heating-chamber. The air by this heating apparatus is raised to a very high temperature and is divided up and drawn to both trunks A of the machine, down which the wheat is falling. Doors X are provided for giving access to each chamber or pair of chambers in the trunks. The actual heating parts are so constructed and protected that there is no danger of the wheat being scorched or burned, the object being to have a machine that will cause the grain to go effectually through all the processes in one operation and by the means of one current of air which is caused to pass through the machine, which latter has such a gentle action as will obviate all danger of the wheat being roughly used or broken in any way.

The mode of action is as follows: The exhaust-fan R being put into operation a stream of cold air is drawn through the passage V into the main heating apparatus S, where it is heated, and the heated air is then divided up and drawn into both trunks A. This heated air therefore entering the trunks comes into contact with the falling grain, extracting the moisture and drying the grain, also draining off any chaff or dust and depositing it in chamber Z. The air takes a very devious course back and forth through and across the produce and at the same time is reheated after each passage through the cold and wet wheat in the chamber L. Consequently should the hot air have become cooled it is at once reheated in the middle chamber L, so that by the time it reaches the top of the machine it has effectually dried the produce and is drawn off through outlet F. This air, carrying a certain amount of dust in suspension, is discharged into the second dust-collector 6, hereinbefore referred to. It is shown in Fig. 5. 7 is the air-trunk from the fan, through which the air is driven by the fan R into the chamber 6. Inside this chamber are hoppers 2 and baffles 8. The dust-laden air having entered this chamber 6, ascends therein against the baffles 8; the dust falling into the hoppers 2. As the air-current is baffled in its ascent, the dust is bound to be deposited in the hoppers. The air, free from dust, escapes through the valves or louvers 9 at top, these being weighted to keep them just open. Should, however, the wind be blowing against them, the louvers at the side the wind is blowing against will close by the wind-pressure against them, while the others remain open and air-current passes steadily through them. This prevents the wind from any quarter working

against the fan. This dust-collector is made of fireproof material. The valves K M in the trunks A check the wheat in its fall and cause it to descend in thin streams, so that the air-currents may act upon it with the greatest possible effect. The devious course which the air-current takes facilitates the hot air getting free access to every particle of the material to extract moisture therefrom. By adjusting the valves K M in the trunk A the weight of discharge is regulated to a nicety. Finally, before leaving the machine the grain is subjected to the final heating operation in the passages T, (here it is not subjected to air-currents at all,) and then the grain is finally exposed to a current of cold air, which is drawn through V into the apparatus by the suction of the exhaust-fan R. This arrangement dispenses with the use of a separate whizzer and makes the apparatus self-contained. The intermediate sloping plates K in the trunks might, perhaps, in some cases be dispensed with or made fixtures instead of hinged.

The fan R discharges air at 85° to 95°. In order to utilize this, I propose putting, as shown in Fig. 6, a loose hopper 11 on the top of C and fixing a foraminous plate 12 in this hopper. The hot air from the fan R is discharged so as to pass through the perforations in this plate 12 and blow the grain onto the feed-rollers D, thus partly drying it before it reaches the machine. The wet grain is fed into the receptacle R and from thence fed forward by the worm 13 into the hopper 11, into which it falls at 14 and 15. In Fig. 7 the grain is fed forward in a similar manner, but falls through the chute 16 into the pipe 17. Here it meets the ascending stream of hot air from the fan R² and is discharged, so that the direction of the stream of grain is diverted and is delivered by the current of air to the feeding-rollers D, the action of the hot air partly drying it.

I declare that what I claim is—

1. An apparatus for drying and conditioning wheat or other granular materials, comprising upright casings, a middle upright chamber between, hinged doors or valves in the casings sloping downward from the hinge in such manner as to allow the granular material to descend in thin streams, holes or passages into said middle chamber located at intervals, through which a current of hot air, reheated at intervals, is passed back and forth across these descending streams, in such a manner as to extract moisture therefrom and effect

the drying of the granular material substantially as described.

2. An apparatus for drying and conditioning grain and other granular material, having straight upright trunks for the streams of descending material, said trunks being provided with holes or passages for air, sloping hinged plates or partitions which divide the said trunks into compartments, leaving passages sufficient to enable thin, approximately vertical descending streams of granular material to pass, heating-chambers located in close proximity to the trunks, also divided into compartments and so connected to the trunks at intervals by said holes or passages that currents of air drawn upward through the trunks will be obliged to pass through these holes and the descending streams of material into said heating-chambers, and from these out through succeeding holes and the descending streams of material, again into the trunks, and so on, the air being reheated in the heating-chambers every time after its passage through the material, substantially as described.

3. In apparatus for conditioning and drying grain or other granular material, the combination with the upright trunks through which the material descends, of a receiving-chamber at top thereof, means for feeding in wet material, combs or grids over which the wet material is caused to flow in thin streams, so as to permit water to drain from the material before being delivered into the trunks, and through which and through the thin stream of material an air-current is passed by a fan, to further draw off water from the material and the said fan, substantially as described.

4. In drying or conditioning apparatus of the kind mentioned, a receiving-chamber formed at each side with fixed combs or grids E, and combs or grids hinged so as to be adjustable to enable them to be set at an angle relative to the adjacent stationary combs and leave an opening between, over which the descending produce will fall, and through which and the descending stream of granular material, air-currents are passed laterally, substantially as described.

In witness whereof I have hereunto signed my name, this 23d day of April, 1904, in the presence of two subscribing witnesses.

RICHARD HORNER.

Witnesses:

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No. 797,604.

PATENTED AUG. 22, 1906.

H. D. PERKY.
MACHINE FOR PREPARING FOOD.

APPLICATION FILED DEC. 10, 1900.

9 SHEETS—SHEET 1.

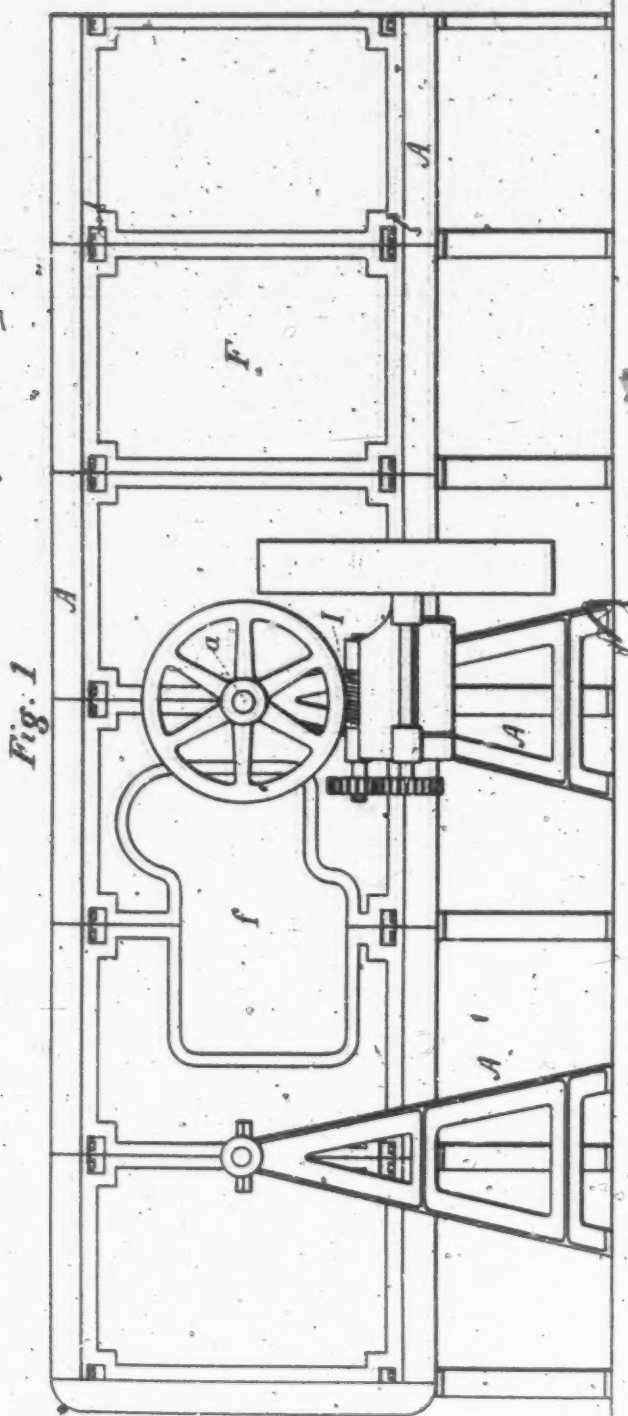


Fig. 1

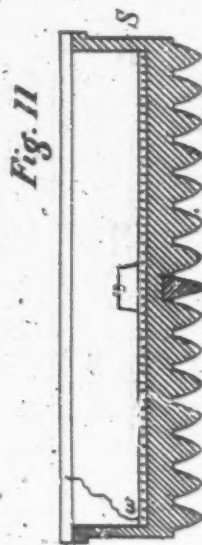
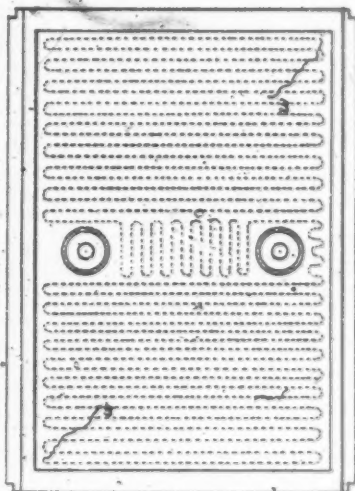


Fig. 11

Fig. 10



Witnesses

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6 SHEETS-SHEET 1

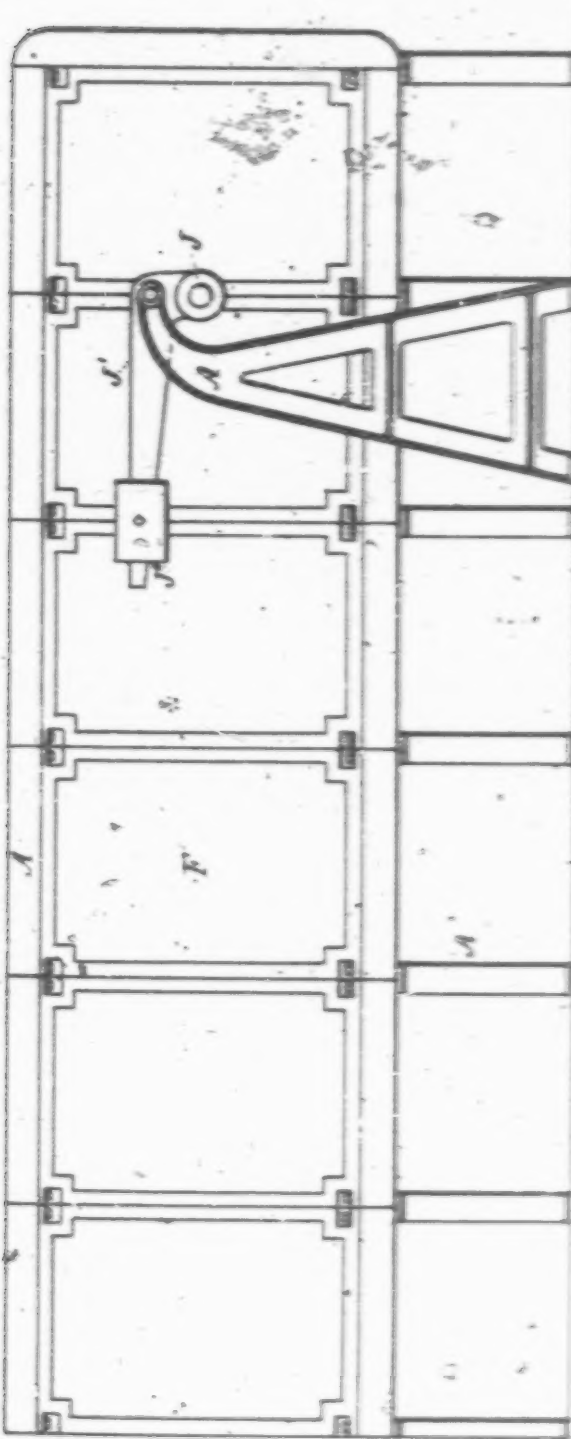


Fig. 1.

Witnesses

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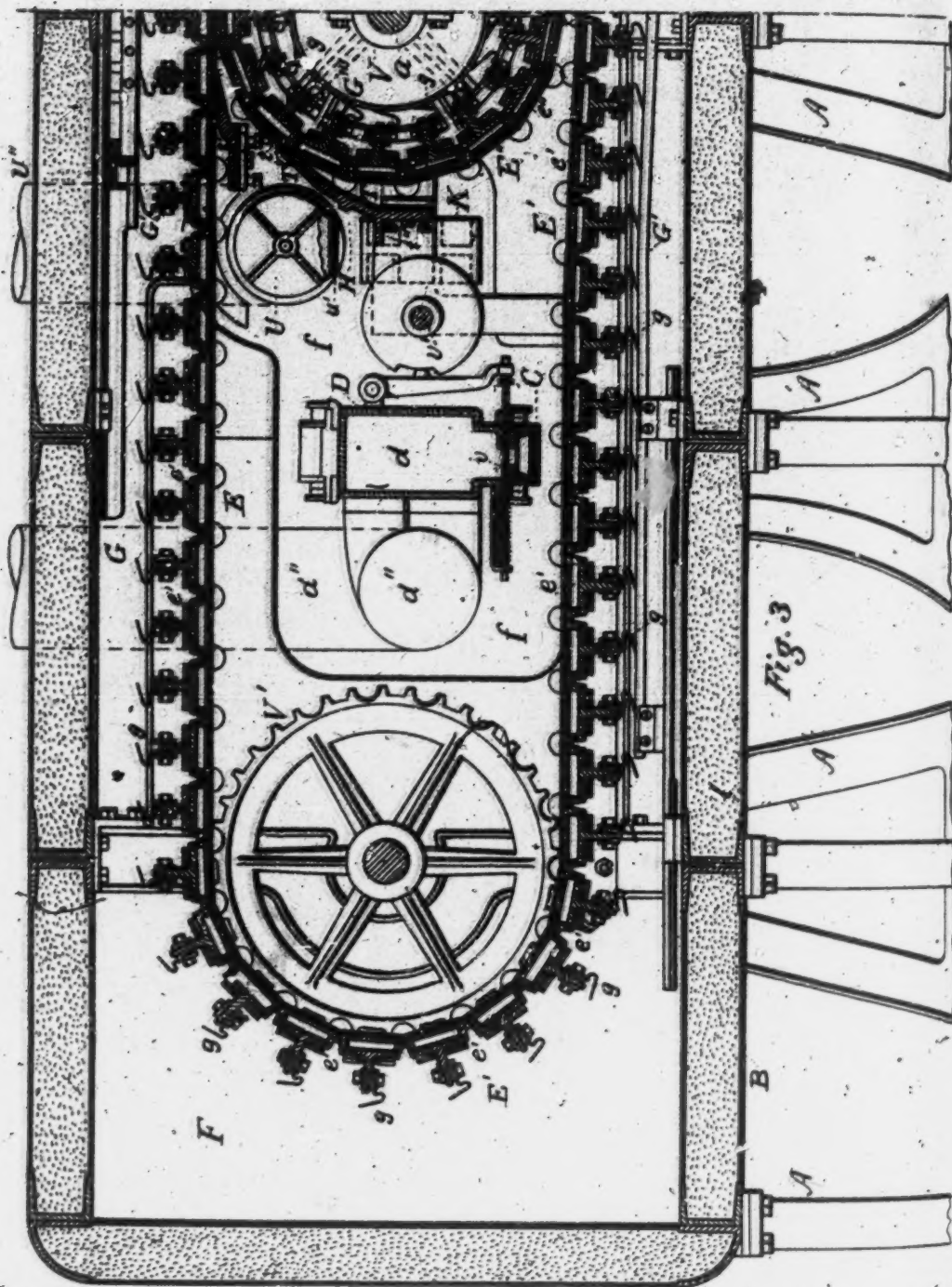
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9 SHEETS—SHEET 3.



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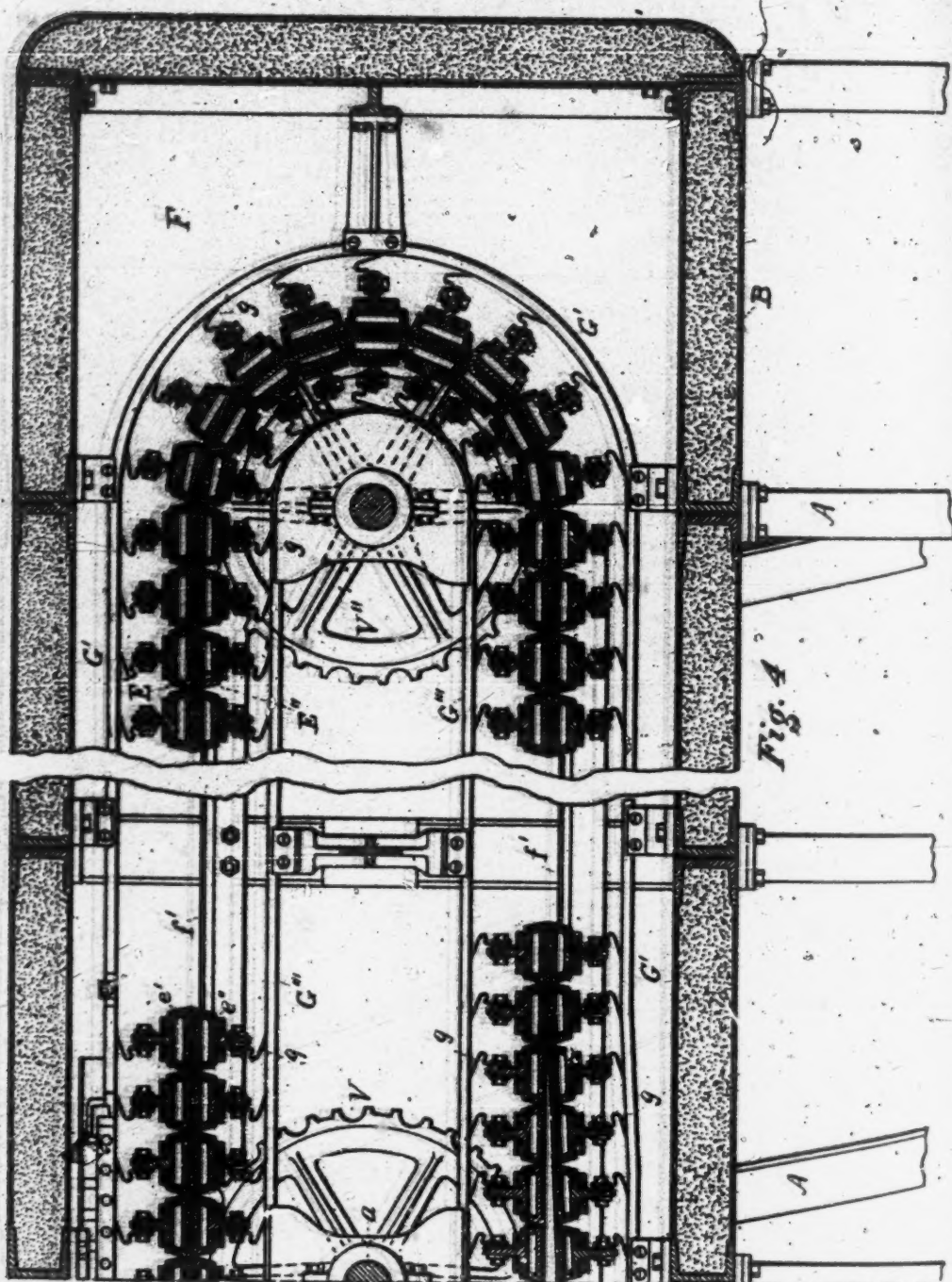
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9 SHEETS—SHEET 4.



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9 SHEETS—SHEET 5.

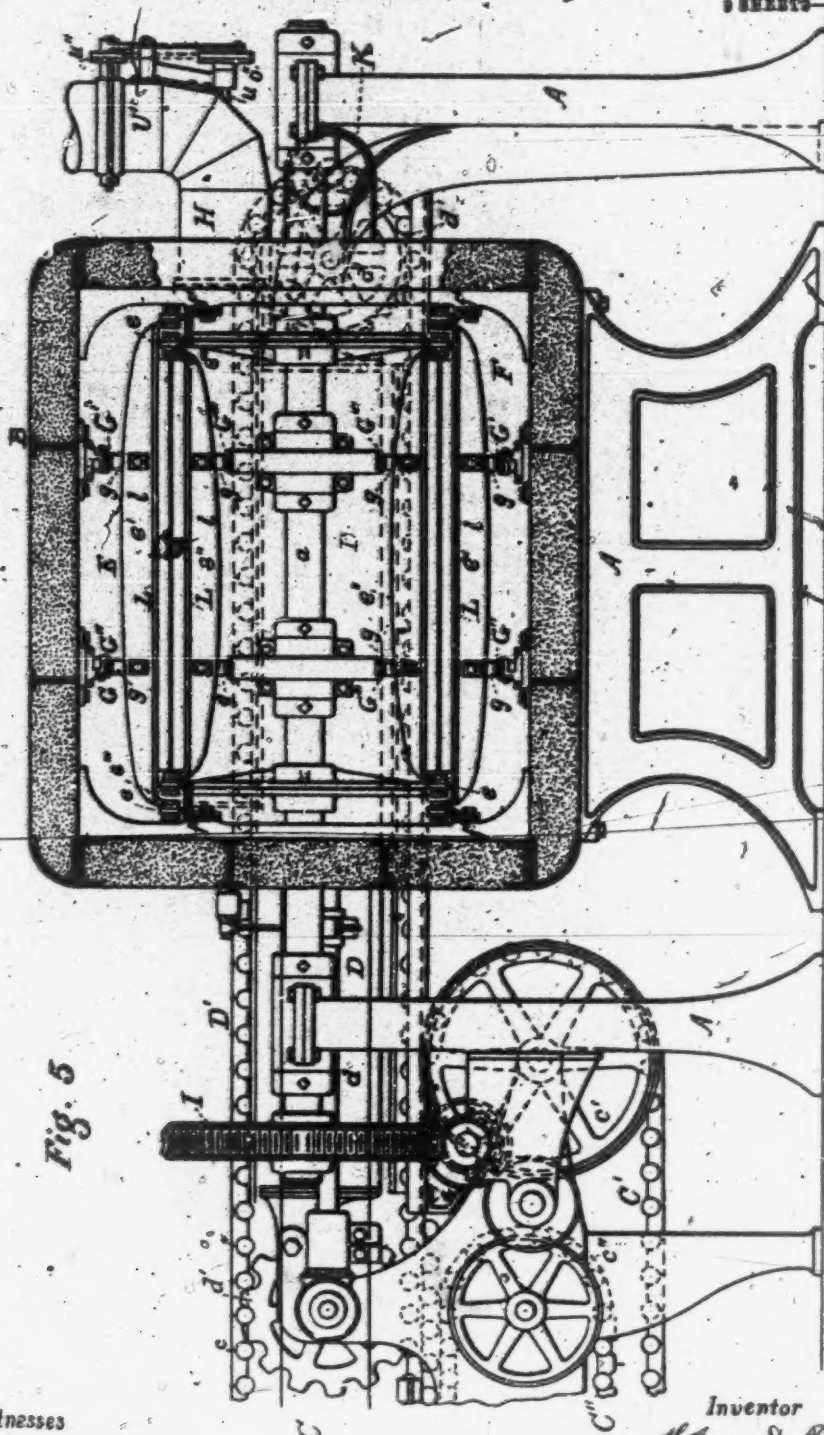


Fig. 5

Witnesses

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PATENTED AUG. 22, 1905.

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APPLICATION FILED DEC. 10, 1900.

9 SHEETS-SHEET 7.

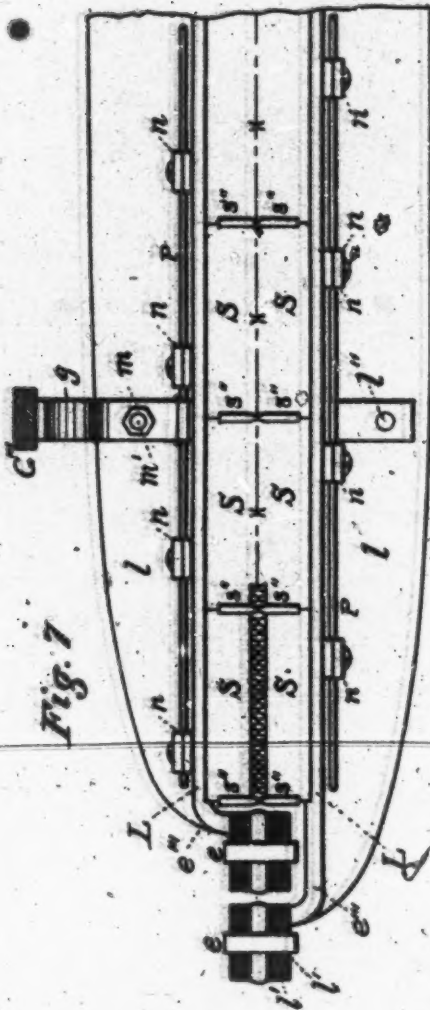


Fig. 7

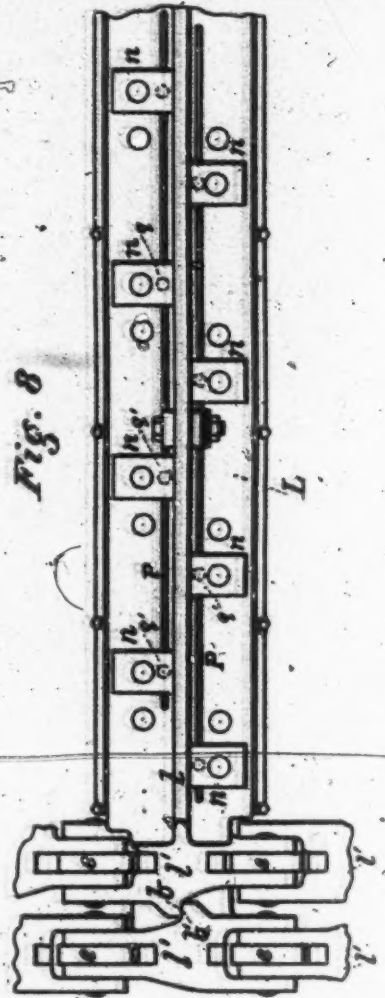


Fig. 8

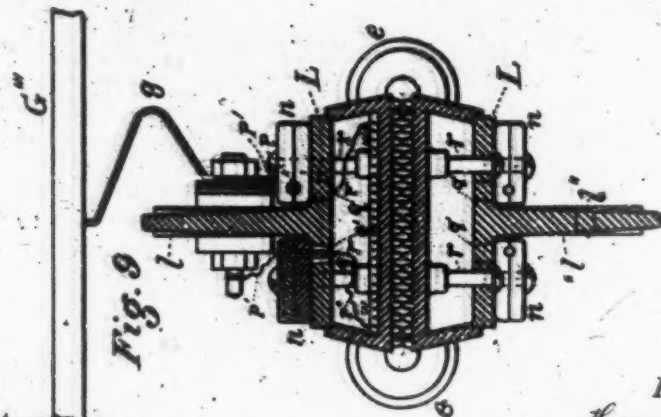


Fig. 9

Witnesses

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9 SHEETS—SHEET 2.

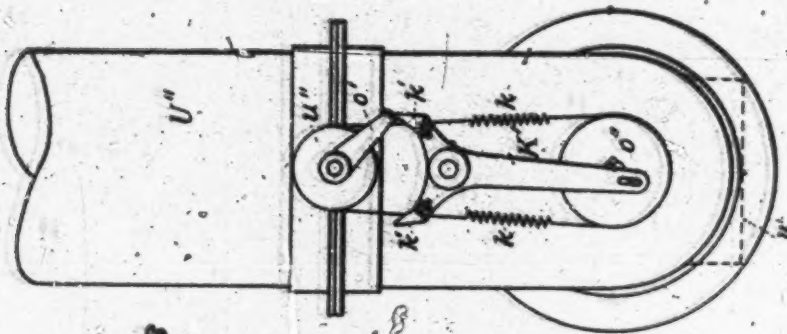


Fig. 13

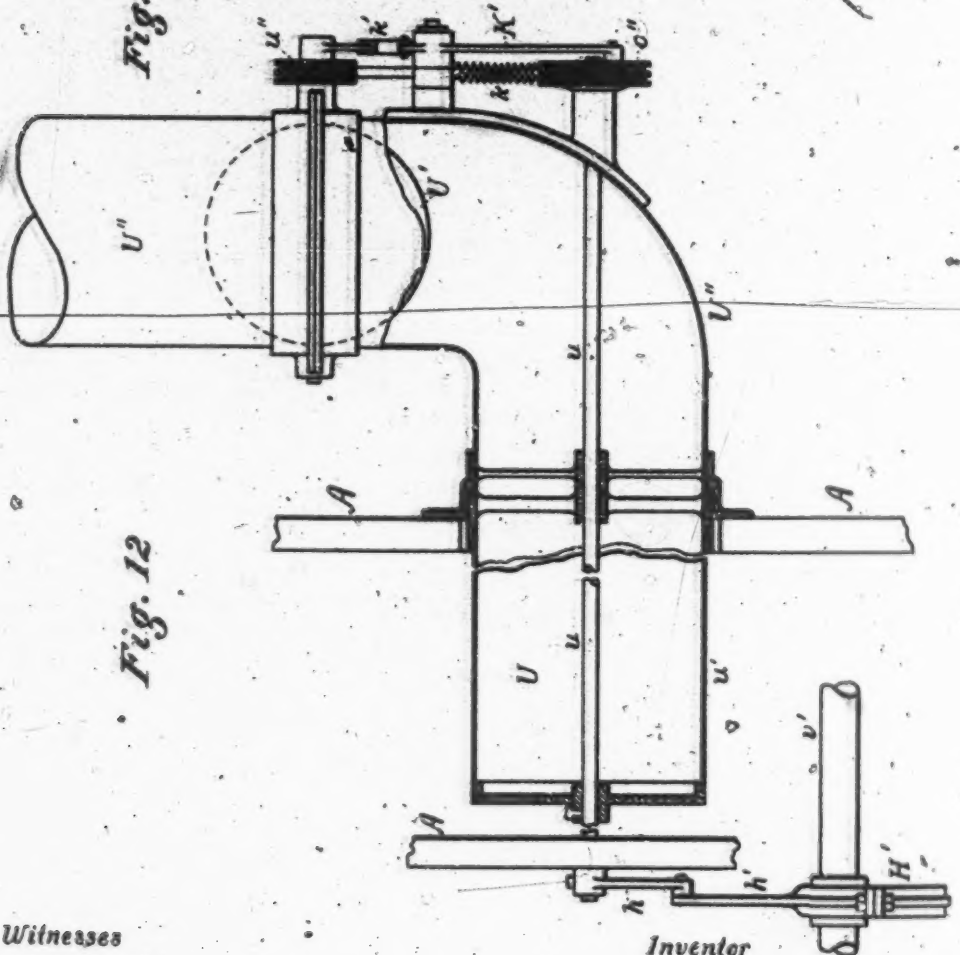


Fig. 12

Witnesses

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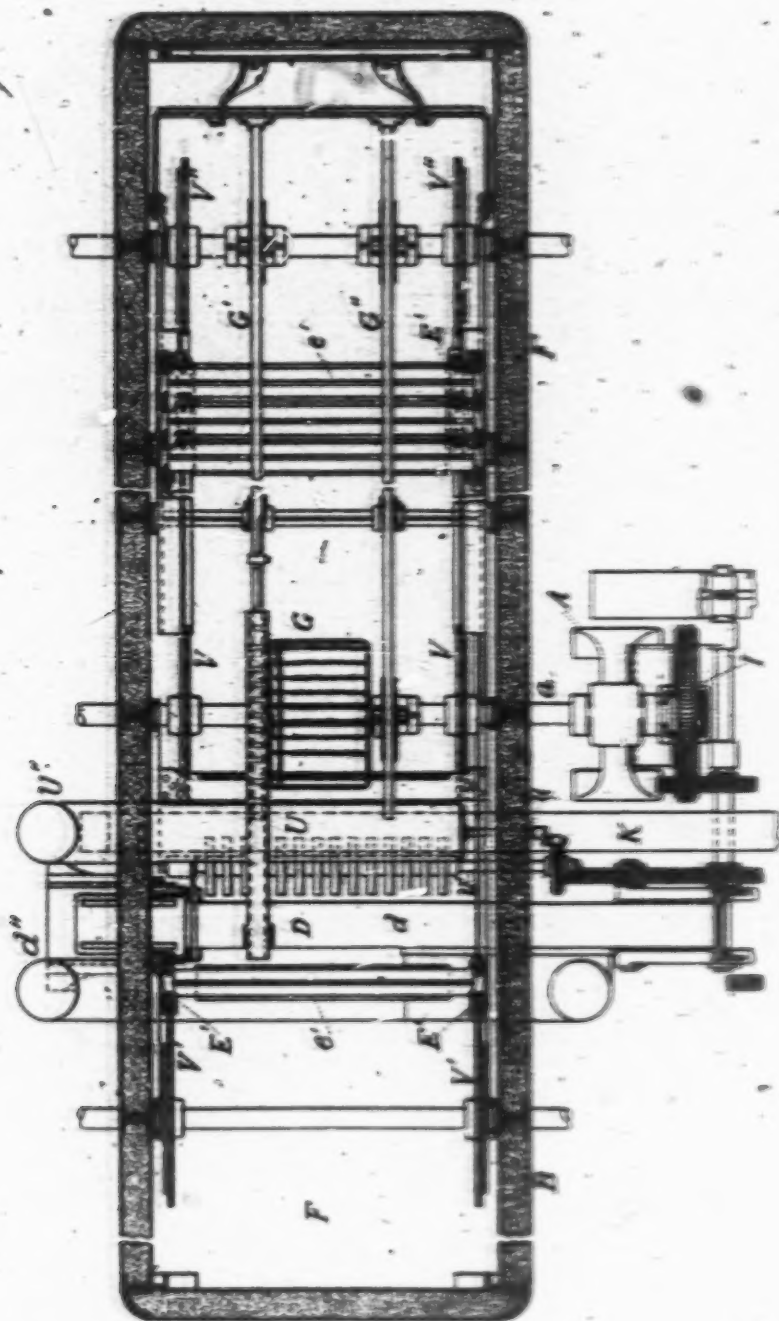
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MACHINE FOR PREPARING FOOD.

No. 797,594.

Specification of Letters Patent.

Patented Aug. 22, 1905.

Application filed December 10, 1900; Serial No. 29,335.

Be all whom it may concern:

Be it known that I, HENRY D. PERKY, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have made a certain novel and useful invention in Machines for Preparing Food; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a side view of one end portion of the oven, showing the feed-opening. Fig. 2 is a side view of the other end portion of the oven. Fig. 3 is a longitudinal section through the portion of the oven in which the feed is located. Fig. 4 is a longitudinal section through the extended portion of the oven in which the heat is mainly applied. Fig. 5 is a transverse section through the feed-opening. Fig. 6 is a plan view of the electric cut-off. Fig. 7 is a back view of one of the heaters or stove-sections, comprising a receiving stove-link and a covering stove-link, partly shown. Fig. 8 is a plan view of the end portions of the link-plates, showing the engagement thereof. Fig. 9 is a transverse section of a stove-section, comprising a receiving stove-link and a covering stove-link. Fig. 10 is a plan view showing the inside of a stove and its wiring. Fig. 11 is a longitudinal section of the same. Fig. 12 is a sectional view of a pneumatic transfer for the discharge. Fig. 13 is an end view of the same. Fig. 14 is a sectional plan view showing the features of the baking mechanism and pneumatic feed.

The object of the invention is to provide means for preparing from grain or other material in a continuous and rapid manner and in large quantities biscuit, crackers, and other articles of food; and the invention consists in the novel construction and combinations of devices, as hereinafter set forth.

In explaining the invention I have designed to set forth more particularly its application to the preparation of food from grain, having special relation to the fibrous, filamentous, or crumbled form of the reduced grain; but it will be apparent that by varying the faces of

the stoves in an appropriate manner the invention may be more generally applied. So, also, I have described a mode of heating the stoves by electricity, as it is preferred; but other means of heating may be used.

In the accompanying drawings the letter A designates framework, usually of iron. B represents the oven wall or casing. C indicates a continuous feed; D, a pneumatic transfer for the feed; E, the continuous baking devices; F, the oven, which is of elongated form; G, the heating devices; H, a transfer device for the discharge; K, the conveyor or discharge for the baked biscuit or crackers.

The reducing devices may be of any known character; but I usually employ a series of grooved reducing-rolls, which shred the grain or crush it into fibrous or filamentous form, as described in Letters Patent No. 571,284, dated November 10, 1896.

The material is received upon the continuous trough-chain C', which is composed of trough-links, which move upon guideways or track-bars, said chain being carried by sprocket-wheels, of which the inner one is indicated at c'.

C' represents the lower chain of cutter-links, and D' the upper chain of cutter-links, which are also suction-links, being open through or provided with a passage for the application of air-pressure. The lower chain of cutter-links is carried by sprocket-wheels, as indicated at c'. The upper chain of suction-links is also carried by sprocket-wheels, (indicated at d'.) The upper chain D' and the lower chain C' are provided with cutter blades or knives c, which are arranged at intervals corresponding to the length of a chain section or width of the baking-band. Suitable trackways are provided in the framing for the links of the chains D' and C'.

The wall of the oven is suitably packed or lined with asbestos or other non-conductor of heat. The oven is of elongated form and, as shown in the drawings, extends at right angles to the direction of the feed. It is provided with an opening at f in the side near one end for the passage of the end of the feed-chain D' of suction-links, this constituting with the chain of trough-links a continuous feed, whereby the material is brought into the oven over the baking irons or stoves. As

the trough-chain does not extend into the oven, a pneumatic device is provided to hold the material to the open or section links, which are faced with wire-cloth, until it reaches position over the stoves or baking-irons. The pneumatic device consists of an air-chamber *d*, to which is connected a suction-fan or exhaust by means of a pipe *e*. The air-chamber is provided along its lower or mouth portion with a valve, or preferably with valves *v*, which are operated by cam devices on a shaft *v* to apply the air-pressure progressively as a section of the material is moving into position, when the cam devices operate simultaneously to close the valves in order to effect its deposit on the stove-link. For a further description of the feed and pneumatic transfer devices reference may be had to Letters Patent No. 881,858, dated August 27, 1901, in which I have explained the construction more at length.

The oven *F*, as heretofore mentioned, extends at right angles to the direction of the feed, the lateral opening *f* for which is much nearer one end of the oven than it is the other. At one end of the oven are provided sprocket-wheels *V* for the endless outer baking-band or chain *E* of receiving stove-links *e*, and at the other end of the oven are the sprocket-wheels *V'* for the inner baking-chain *E'* of covering stove-links *e'*. Near and at one side of the opening *f* is provided a drive-shaft, carrying sprocket-wheels *V* for the inner and of said baking-band or covering-chain *E'*. In this construction, therefore, one of the baking-chains runs inside the other chain, which is longer than the first or inner chain and is uncovered in that portion of the oven where the feed is located, thereby forming an extension-loop for the inside feed or discharge. The covering stove-links are brought down into position on the receiving stove-links of the larger chain by the wheels *V* at one side of the feed. From this point the inner and outer stove-links continue together to the end of the oven and back to position at the side of the feed, where the discharge of the baked biscuit or crackers takes place.

Each chain consists of stove-links which are pivoted to each other, the pivotal axis or axis of bend of adjacent links being coincident or in line with the adjacent or meeting edges of the working or baking faces of the stoves and in the plane of such baking-faces.

The outer or receiving stove-link *e* and the inner or covering stove-link *e'* constitute a stove-section, the parts of which must have an accurate fit in the movements, and to this end one chain, preferably the inner chain, is that which engages the sprocket-wheels of the driving-shaft *a*, while the outer chain is driven by the engagement of its links with those of the inner or driving chain. For this purpose each link of the inner chain is formed with arc-shaped shoulders or projections *b* to

engage correspondingly-curved shoulders or projections *b'* of the outer stove-link. The stove-section thus formed of a receiving or outer stove-link and a covering or inner stove-link is made of proper length to take in a section of biscuit or cracker material as deposited by the feed. The outer and inner stove-links are each provided with anti-friction-rollers (indicated at *c*) which run on suitable tracks or ways *f'* of the oven. As these links are designed to have the same pitch-line, their tracks are arranged side by side and their body portions are formed with bent or angular arms *f''*, the bearings or rollers at which are axially flush with the faces of the stoves and axially in line with the edges of such faces, interference being avoided by making the arms of one link longer than those of the other. In order to allow for expansion and contraction of the outer chain, each link is provided with a slightly elongated or enlarged opening for the connecting pin. This construction keeps the working or baking faces of adjacent stoves together at their pivotal edges in moving around the curves, so that the tendency to rupture the material carried thereby is reduced to a minimum. The pivotal axis of the stoves lies in the baking-plane or plane of the baking-faces.

At one end of the oven an automatic take-up or tension is provided for the chain of stove-sections. This consists of a swinging shaft *J*, carrying the end sprocket-wheels *V'* and being journaled in bearings in the vertical arms of the angle-levers *J'*, whose horizontal arms are provided with adjustable weights *J''*. The movement of the baking-chain is slow and is communicated by means of a worm and a worm-wheel, as indicated at *L*.

The oven and stoves are preferably heated by means of electricity. To this end, the oven is provided with outer parallel bus-bars or contact-bars *G'* *G''* and with inner parallel contact-bars *G'''*. These contact conductor-bars are laterally arranged and parallel and are connected at convenient points to the source of supply. The contact-bars are also parallel to the baking-chains, and on one side the bars may be regarded as positive, the bars on the other side being negative.

It is designed that each stove or baking-iron shall take its heating charge independently in order to facilitate the replacement and repair of parts without undue interference with the baking operation of the machine. Contact is made with these bus-bars by means of the spring-brushes *g*, which are so bent or formed that their contact ends will be in the middle or radial plane of each stove-link, this being the most accurate and economical construction for running the curves of the bus-bars. Usually the contact-brush is formed of two leaves, one extending a little beyond the end of the other, so that the breaks

made in the current at the cut-off intervals $g'g'$ of the contact-bar G will not be so pronounced as to cause injurious sparking.

The contact-bars G' and G'' for the outer chain of the stove-links are not usually extended around the feed end of the oven, as it is desired to cut off the electric action in this portion of the chain, where a baking heat is not needed. The contact-bars G'' for the inner chain are, however, continuous, and this chain is for nearly its entire length in baking position.

To reduce the electric action in the stove-links gradually and finally cut it off, a series of gradually-increasing resistances $Z'Z'E'$ is employed between the body portion of the contact-bar G' and the several separated portions or contact-sections $s's's'$, which are separated from each other and from the main bar by the intervals or breaks g' . As the bodies of the stove-links pass over this portion the current, taken off gradually by the several resistances in succession, will be dropped in each stove-link by degrees and finally to zero.

The outer and inner stove-links may be similar to each other, the longer roller-carrying arms of one link, however, extending beyond or encompassing the roller-carrying arms of the other link. Each link consists, according to the construction illustrated, of an elongated body portion or plate L , having a middle projection or rib l extending along its back, the plane of such projections or rib being radial with reference to its movement around the sprocket-wheels. The end arms or extensions of the rib are expanded to form the link connections, as at T . In proper position with relation to each contact-bar is provided in the rib an opening or perforation f' , in which is seated a non-conducting bushing n , which is secured in position by and forms a bearing for the short conductor bolt or pin w , whereby the spring-brush g is also secured in position.

To the body-plate at each side of the rib l are connected detachable insulation strips or blocks n , preferably of porcelain, between which are seated the conducting-wires $p p$ of the link, one wire serving for the entrance of the current and the other for its exit, or the wires will serve in connection with the alternating current. These wires are connected to their respective brushes $g g$ by small flexible wires $p'p'$, and from these same wires $p p'$, respectively, small terminal wires $p''p''$ pass to the stove-wirings w of each stove or baking-iron through the lava plugs g , which are tapering in form and are seated in beveled openings g' in the body-plates at the sides of the middle rib, these plugs being held in position by the porcelain strips n when used.

The detachable stoves or baking-irons S are arranged in series along the body-plates trans-

versely to the line of movement of the chain. Each stove consists of a rectangular casting, usually hollow or recessed in its outer portion or back, but having its inner or baking face formed to correspond with that of its fellow stove. The preferred construction is to form the baking-face with a surface distribution of pointed studs or projections designed to penetrate the material being cooked and carry the heat into deeper portions. These stoves or baking-irons are provided with dividing plates or knives, (indicated at s''), which serve to indent or separate the material deposited on the stove-link into parts of convenient size to form crackers or biscuit.

The side walls or flanges of the inner stoves are of inclined formation or beveled, so that they will conform to each other in passing round the sprocket-wheels. On the floor or back of the baking-wall of the recess or chamber of the stove is laid insulating material or insulating-paint, on which is placed the distribution of fine wiring w required for the heating, this wiring being covered in by another layer of insulating material or paint. When each stove-wiring is independently connected or connected in parallel with the other stove-wirings to the link conductors $p p$, each stove is arranged for independent heating and may be detached without interfering with the other stoves. The recesses of the stoves are covered in with the link plate or body, to which the stoves are secured by means of short bolts or connections v , and in this manner the interior delicate wiring and insulation are effectually protected and additional insulation of air is provided.

To arrange for the clearance and discharge of the crackers or other product after baking, a lateral opening in the oven-wall is arranged near the location of the feed-opening, or the feed-opening f may be made of sufficient size to accommodate the end of the conveyor K , which extends from this location of its receiving end within the oven outward therefrom in a direction at right angles to the length of said oven. Leading to this conveyor is a guide or slide way T , which extends in an inclined or curved manner downward and from the faces of the stoves of the inner or shorter baking-chains as they pass around the upper parts of the inner sprocket-wheels. This guide or slide way is provided with an adjustable comb or clearing device T' , having for use in connection with a studded baking-iron, such as has been before described, fingers t , designed to enter between the teeth or projections of the faces of the stoves. By such means as the stoves move around the wheel the biscuit or crackers will be loosened and guided off the stoves to the slideway, on which they will descend to a stop rib or flange t'' .

Above the clearing device or comb T' is provided another clearer t' , which is designed to

loosen the biscuit or crackers which may adhere to the stoves of the longer or outer chain and cause the same to fall upon the slideway T, above referred to.

The lower portion of the slideway T is located above and at the sides of the conveyor, and both are arranged at about the same radial distance from a shaft *u*, which carries a suction-head U, having a wire-cloth-covered mouth *v*. This suction-head is connected to an air-exhaust by means of a curved pipe or otherwise. Suitable mechanism is employed to give this suction-head vibratory motion, its movement being quadrantal or through an arc of about seventy degrees. When it is turned toward the slideway T, the suction causes the crackers to adhere to the wire-cloth-covered mouth, whereby on the reverse movement of the head the crackers are carried over the conveyor, whereon they are dropped as the air-valve of the suction or exhaust is closed. In the drawings the exhaust-pipe is indicated at U', the end of the suction-head U bearing in the end of said pipe, the latter carrying the cut-off valve or damper U', whose journal is provided with a pulley *w*. On the end of the suction-head shaft is provided a crank-arm A, which is connected by a pitman A' with an eccentric H' on the shaft *u*, the rotation of which causes a proper vibration of the suction-head. To move the air-valve or damper U', springs *B* & *B* may be employed in connection with the cross-head or wheel *w*', which is provided with an arm or catch *c*' to engage the trip and holding lever K', which is vibrated by means of a wheel *d*' on the suction-head shaft *u*. The lever K' has the trip-arms *E* & *E*, which respectively engage the catch of the damper, according to the position in which it is thrown by the springs to open or close the air-pipe—that is to say, when the damper is opened the exhaust is on and the suction-mouth applied to the material on the slideway T. The damper is held in this position by engagement with one of the arms *E* of the trip-lever. As the suction-head moves back over the conveyor the trip-lever is gradually moved until the damper is released from the trip-arm which held it and is suddenly closed by the spring tension, this movement also serving to effect the engagement of the damper-catch with the other trip-arm of the lever K'. The damper is opened in a similar way by the reverse movement of the trip-lever. In order to protect the stove-wirings from injury through short-circuiting or from other accidental increases of current, fuses are provided in the conductors *p* & *p*', leading to the broches, such fuses consisting usually of sections of fine copper wire, or the conductor-wire *p*' may constitute the fuse.

The pneumatic transfer to take the articles from the baking-chain links and deposit them on the conveyor-belt may be dispensed with

because they will then readily slide down the guideway to the belt. In this case the slideway T is constructed without ledges to stop the biscuit or crackers.

It is not designed to confine this invention to the construction shown and described, as the stoves and other portions of the mechanism may be varied in ways known to those skilled in the art without departing from the principles involved.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A machine for preparing food consisting of a series of moving baking-stoves, conduction devices attached to each stove, independent conductors in connection with the conduction devices of each stove, and an electric-supply conductor common to such independent conductors, substantially as specified.

2. In a machine for preparing food, the combination with an endless series of moving baking-stoves, of conduction devices attached to each stove, moving conductors for supplying said conduction devices with electricity, and a fixed conductor common to said moving conductors, substantially as specified.

3. The combination with a body-plate, of a series of detachable stoves or baking-irons, cutting-plates, and means of attachment of said stoves and plates to said body-plates, substantially as specified.

4. An endless chain of link-plates, pivoted to each other, and a transverse series of detachable stoves or baking-irons, attached to each link-plate, substantially as specified.

5. The combination with an inner chain of stove-links, of an outer chain of stove-links engaging said inner chain, and extending beyond the same to form a reception-loop for the food and discharge, substantially as specified.

6. The combination with an endless covering baking-chain, of a longer endless receiving baking-chain having an extension for the feed beyond the shorter covering baking-chain, substantially as specified.

7. The combination with an endless inner baking-band, of an endless outer baking-band, having an extension beyond said inner baking-band for the feed, substantially as specified.

8. A stove-link plate having a back rib or projection extending lengthwise, and provided with expanded link-connection-bearing arms at its ends, substantially as specified.

9. The combination with side-by-side trackways of a receiving stove-plate and a covering stove-plate having bearing-arms of unequal length for such trackways, substantially as specified.

10. A link-plate having a series of detachable stoves connected thereto, and provided at its ends with link connections, and bearings axially flush with the faces of said stoves, substantially as specified.

plate of a series of independent detachable stoves attached to said plate, and independent wiring for electric heating connected to each stove, substantially as specified.

12. An elongated heater-plate, having a back rib or projection carrying insulated conductors, insulated conductors extending along said plate, detachable stoves, connected to said plate, insulated wiring for said stoves, and conductor-wires extending from said wiring to the conductors extending along said plate, substantially as specified.

13. An elongated plate, having a back rib or projection, insulated conductors attached thereto, detachable insulation on each side of said rib or projection, conductors carried by such detachable insulation, stoves connected to the plate, insulated wiring on said stoves, and independent connecting-wires from such wiring to the conductors carried by said detachable insulation, substantially as specified.

14. In a machine for preparing food, the combination with a driving-wheel, and an endless driving-chain of baking-stoves engaging said driving-wheel, an endless driven chain of opposite baking-stoves, and means of engagement between the opposite stove-links of the driven chain, and driving-chain, substantially as specified.

15. In a continuous baking-machine, the combination with an endless outer or receiving chain of stove-links, of an endless inner or covering chain, of stove-links, sprocket-wheels, and automatic devices to allow for the expansion and contraction of such chains, substantially as specified.

16. In a continuous baking-machine, the combination with the endless outer or receiving chain of stove-links, and the sprocket-wheels, of the endless inner or covering chain of stove-links, and engaging devices of the latter, whereby the outer or receiving chain of stove-links is driven, substantially as specified.

17. The combination with a continuous pneumatic feed of a continuous baking device extending at right angles to the line of movement of such feed, substantially as specified.

18. The combination with an endless baking-band of a continuous pneumatic feed, substantially as specified.

19. The combination with an elongated oven, having a lateral opening for the feed, and trackways, of an endless outer receiving baking-band, a shorter endless inner or covering baking-band, and means for heating, substantially as specified.

20. The combination with an elongated oven, having an opening for the feed and trackways, of a long endless outer or receiving chain of stove-links, a shorter endless inner or covering chain of stove-links, and means for heating, substantially as specified.

21. The combination with an oven, having a lateral opening for the feed, and side-by-side trackways, of a long endless outer chain of stove-links, and a shorter endless chain of stove-links, having the same pitch-line, sprocket-wheels for such chains, and means for heating, substantially as specified.

22. The combination with an elongated oven, having a feed-opening, of a feed and a discharge at right angles to the length of the oven, a clearing-slideway, an endless outer or receiving baking-chain, a shorter endless inner or covering baking-chain, and trackways for said chains, substantially as specified.

23. The combination with a long endless outer baking-band, of a shorter endless inner baking-band, clearing devices for such bands, and feeding and discharging devices extending within the loop of the outer band, and at right angles to the length thereof, substantially as specified.

24. The combination with an oven, and an endless baking-band, of the wiring of such band, the contact-bars extending parallel to such band, and the contact-brushes, substantially as specified.

25. The combination with an oven, its trackways, and contact-bars, of the endless chains of stove-links, the link conductors, the series of stoves or baking-irons connected to said links, the wiring of said stoves, and the spring-brushes adapted to engage the contact-bars, substantially as specified.

26. In a baking-machine, the combination with an endless feed, of an endless baking-chain, and conducting devices for the application of electricity to said baking-chain, substantially as specified.

27. In a baking-machine, the combination with endless-motion carrying devices of endless-motion feeding devices, and stoves or heaters connected to said carrying devices, and means for heating the same, substantially as specified.

28. The combination with endless sectional baking mechanism, of an endless pneumatic feed, and an automatic discharge, substantially as specified.

29. In a machine for preparing food, the combination with a continuous feed and endless baking-bands moving at right angles to the direction of the feed, or baking the material in sections, means for indenting the material and locking the same together at points to secure compactness with lightness of structure, and means for discharging the baked product upon a conveyer, substantially as specified.

30. A continuous baking-machine, comprising an endless chain of baking-links upon which the material is received, an endless chain of baking-links adapted to cover in the material upon the links of the first chain, means of engagement, whereby the links of

the two baking-chains are run in exact relation to each other, and means for heating the baking-chains, substantially as specified.

81. A machine for preparing food, comprising two endless rows of links, and means of engagement between said chains, baking-bars connected to said links and wired for electric heating in connection with brushes of said links, conductor-bars, in contact with which the brushes of the rollers, and means for automatically cutting off the electric action where it is unnecessary, substantially as specified.

82. In a machine for preparing food, the combination with moving stoves, of the insulated fine wiring connected thereto, the electric conductors extending parallel to the line of movement of such stoves, and the moving

brushes in connection with said wiring and engaging said electric conductors, substantially as specified.

83. The combination with moving stoves, of the conduction devices attached to said stoves, the electric conductors extending parallel to the line of movement of such stoves, the moving brushes in connection with said conduction devices and engaging said electric conductors, and an automatic graduated cut-off for the electric action, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY D. PERKY.

Witnesses:

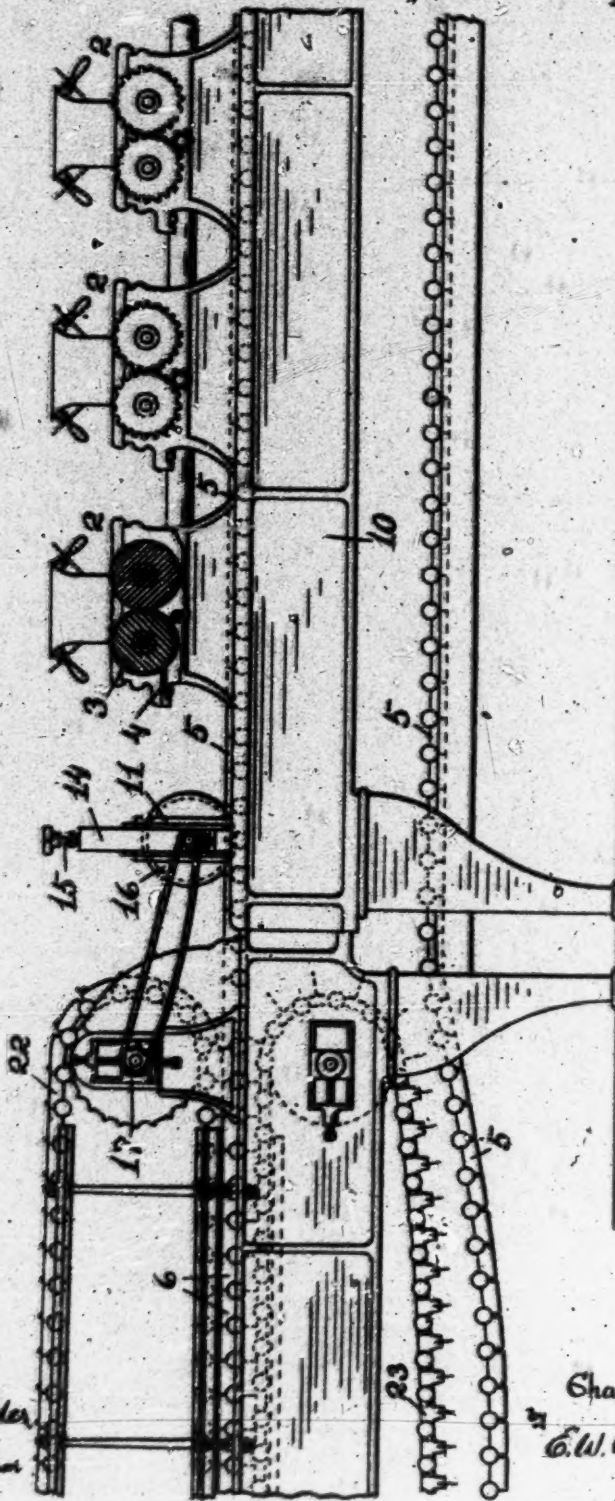
ALBERT H. CHAPPEE,
J. R. GILKESON.

C. E. SMITH.
 MEANS FOR MANUFACTURING FILAMENTOUS DISCUT.
 APPLICATION FILED JAN. 23, 1912.

1,195,114.

Patented Aug. 15, 1916.
 2 SHEETS—SHEET 1.

Fig. 1.



Witnesses
 Stuart Hilder
 James M. Anderson

Inventor
 Charles E. Smith.
 E. W. Anderson & son
 Attorneys

C. E. SMITH.
 MEANS FOR MANUFACTURING FILAMENTOUS BISCUIT.
 APPLICATION FILED JAN. 23, 1912.

1,195,114.

Patented Aug. 15, 1918.

2 SHEETS—SHEET 2.

Fig. 2.

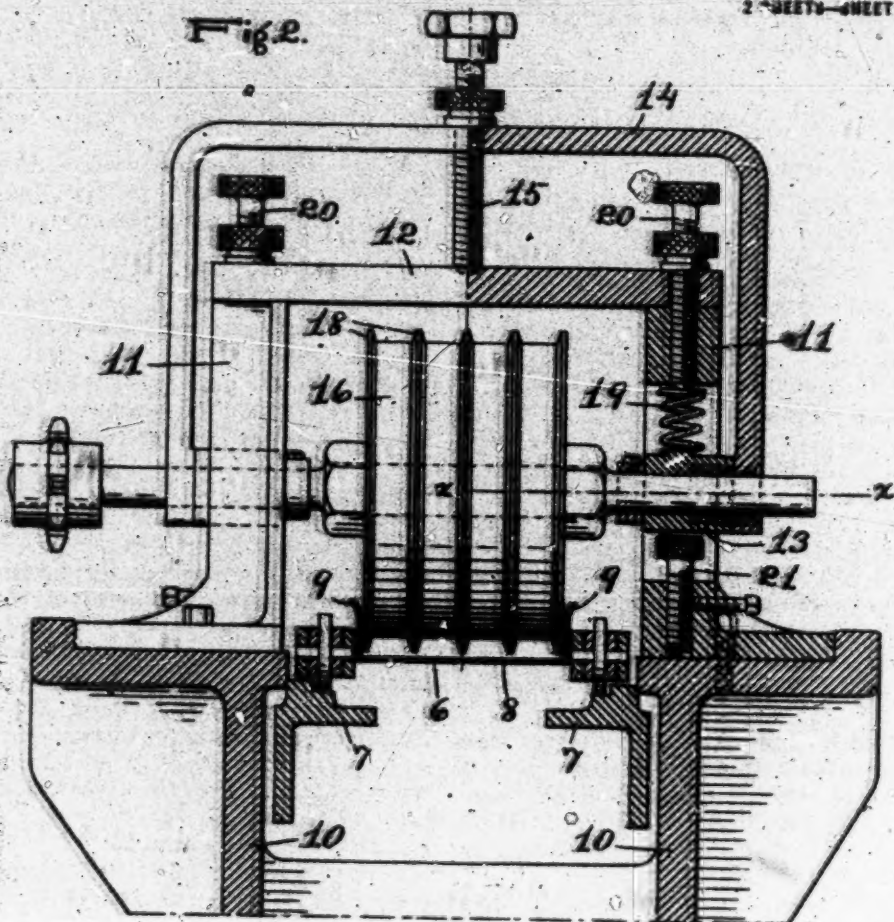
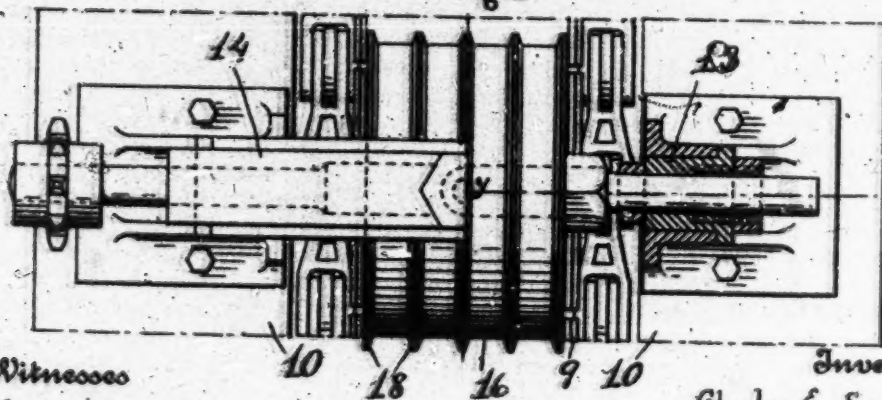


Fig. 3.



Witnesses

Stuart Hilder.
 Francis M. Anderson.

Inventor

Charles E. Smith.

E. W. Anderson for
 his Attorneys

UNITED STATES PATENT OFFICE.

CHARLES E. SMITH, OF NIAGARA FALLS, NEW YORK, ASSIGNOR TO THE SHREDDED WHEAT COMPANY, OF NIAGARA FALLS, NEW YORK.

MEANS FOR MANUFACTURING FILAMENTOUS BISCUIT.

1,195,114.

Specification of Letters Patent.

Patented Aug. 15, 1916.

Application filed January 22, 1912. Serial No. 673,893.

To all whom it may concern:

Be it known that I, CHARLES E. SMITH, citizen of the United States, resident of Niagara Falls, in the county of Niagara and State of New York, have made a certain new and useful Invention in Means for Manufacturing Filamentous Biscuit; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a side view of a roll machine illustrating the invention. Fig. 2 is a transverse view, enlarged and partly in section, on line *y-y* Fig. 3. Fig. 3 is a top view enlarged and partly in section on line *x-x* Fig. 2.

The object of the invention is to provide means for manufacturing filamentous biscuit of smaller size than the width of the reducing rolls, and it consists in the novel construction and combinations of devices, as hereinafter set forth.

Roll machines for the manufacture of filamentous biscuit are of considerable size, the grooved reducing rolls being usually made about five inches long, because smaller rolls would materially increase the complication and expense of connected apparatus for preparing and feeding the grain, as well as of the rolls themselves, considered in relation to the production. The band of piled filaments which is formed on the receiver must be subdivided into biscuit forms, and this has been accomplished by means for pinching the band transversely, this pinching serving not only to subdivide the band into biscuit sections, but also to compress the filaments together at the lines of subdivision, so that each biscuit form is an entirety, its filaments being pinched together and securely joined at their ends. The width of these biscuit forms, however, corresponds with the length of the reducing rolls. In order to make biscuit of less width from such a band of filaments, it is designed to pinch the band longitudinally, that is to say in the direction in which the filaments lie, substantially parallel to each other, in the receiver; and as these filaments are loosely

piled they are designed to be brought somewhat closer together, so that the pinching will be effective in forming the edges of the biscuit. In the accompanying drawings, illustrating the mechanism preferred to accomplish these results, the numeral 2 indicates the reducing roll heads, having finely grooved rolls 3, from which the grain, softened by water and cured in the usual manner, is discharged in filament form by discharging strips 4 upon a moving receiver 5, which is in the form of a belt of links 6, which run upon a suitable track 7. The link 6 has a flat bottom 8 and lateral flanges 9.

Means are provided to produce longitudinal divisional creases in the layers or band of filaments upon the receiver, said means consisting preferably of a flanged roller of proper width to run easily between the flanges of the links 6. To this end, supports 11 are secured to the framing 10 at the sides of the track, and these supports are connected by a transverse bar 12, and provided each with a vertical slot, through which passes a bearing lug 13 of a bail-form frame 14 having an adjusting screw 15.

The creasing roller 16, of proper width to run easily between the flanges of the links 6, is provided with a shaft whose journals are seated in the bearing lugs of the frame 14; and, as it is preferred to run the roller by a positive drive, the shaft is provided with a sprocket wheel which is geared to a sprocket wheel 17 in connection with the belt-moving mechanism. On the roller 16 are circumferential V-form or laterally beveled flanges 18, designed to crease or pinch the band of filaments longitudinally against the bottoms of the links of the receiver belt. This roller is suspended by the bail-frame 14 and its adjusting screw, its shaft engaging the bearing lugs of said bail-frame; and engaging these lugs on top or in the upper portions of the slots of the supports 11 are springs 19, which, in turn, are in engagement with adjusting screws 20, seated in said supports. In this way it is designed to regulate the pressure of the springs interposed between the bearings of the creasing roller and the support, to compensate for the adjustment of the yieldable bail-form frame. Inequalities of motion of the receiver and variation in the consistency of the filament material are also provided for.

The adjustable screw 15 of the bail-form frame, bearing upon the support, is capable of being lifted and separated therefrom under strain. Extending into the supports 11 below the bearing lugs are check screws 21, whereby the downward movement of the roller 16 is limited and the thickness of the layer is gaged. The link receiver belt is designed to pass between an upper endless belt 22 of cutting or pinching links and a lower endless belt 23 of cutting or pinching links, the links of each belt having transverse flanges which operate between the carrying links 6 of the receiver. The smooth surface of the roller 16, between its flanges, serves to somewhat compress the filaments together and shape the tops of the sections of the band of filaments, so that they are made of even thickness. The beveled form of the flanges of the roller is designed not only for compressing the filaments laterally, but also to give form to the sides of each section or subdivision and to provide that the flanges shall leave the band of filaments easily and without adhesion. By these devices it is designed that the band of longitudinal filaments piled on the receiver shall be creased or pinched longitudinally and transversely, to subdivide it into small uniform sections. Owing to the preferably limited number of filaments piled upon each other it is quite open in structure and freely pervious to air, and it is designed that the longitudinally creasing means shall compress the band of filaments to substantially close the interstices thereof.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a machine of the class described, a support, a yieldable frame having an adjustable device bearing upon said support and capable of being lifted and separated therefrom under strain, and a creasing roller having bearings in said frame and yieldable therewith.

2. In a machine of the class described, a support, a yieldable frame having an adjustable device bearing upon said support and capable of being lifted and separated therefrom under strain, a creasing roller having bearings in said frame and yieldable therewith, and adjustable means underlying said

bearings for limiting the downward movement of said frame and of said roller.

3. In a machine of the class described, a support, a yieldable frame having an adjustable device bearing upon said support, a creasing roller having bearings in said frame and yieldable therewith, springs interposed between said bearings and said support, and means for adjusting the tension of said springs.

4. In a machine of the class described, a support, a yieldable frame, an adjustable screw threaded in the central portion of said frame and having a bearing upon said support capable of being lifted and separated therefrom under strain, a creasing roller having bearings in said frame and yieldable therewith, springs interposed between said bearings and said support, and means for adjusting the tension of said springs.

5. In a machine of the class described, a support, a yieldable frame, an adjustable screw threaded in the central portion of said frame, having a bearing upon said support capable of being lifted and separated therefrom under strain, a creasing roller having bearings in said frame, springs interposed between said bearings and said support, screws upon said support for adjusting the tension of said springs, and screws underlying said bearings for limiting the downward movement of said frame and of said roller.

6. In a machine of the class described, a support bridging the track of a movable receiver and provided with slots, a yieldable frame having lateral arms engaging said slots, a central adjustable screw carried by said frame and having a bearing upon said support, a creasing roller having bearings in said arms, springs interposed between said arms and said support, screws threaded in said support and engaging said springs, and check screws underlying said bearings to limit the downward movement of said frame and of said roller.

In testimony whereof I affix my signature, in presence of two witnesses:

CHARLES E. SMITH.

Witnesses:

JAS. TRAVERSE,
E. HANNEL.

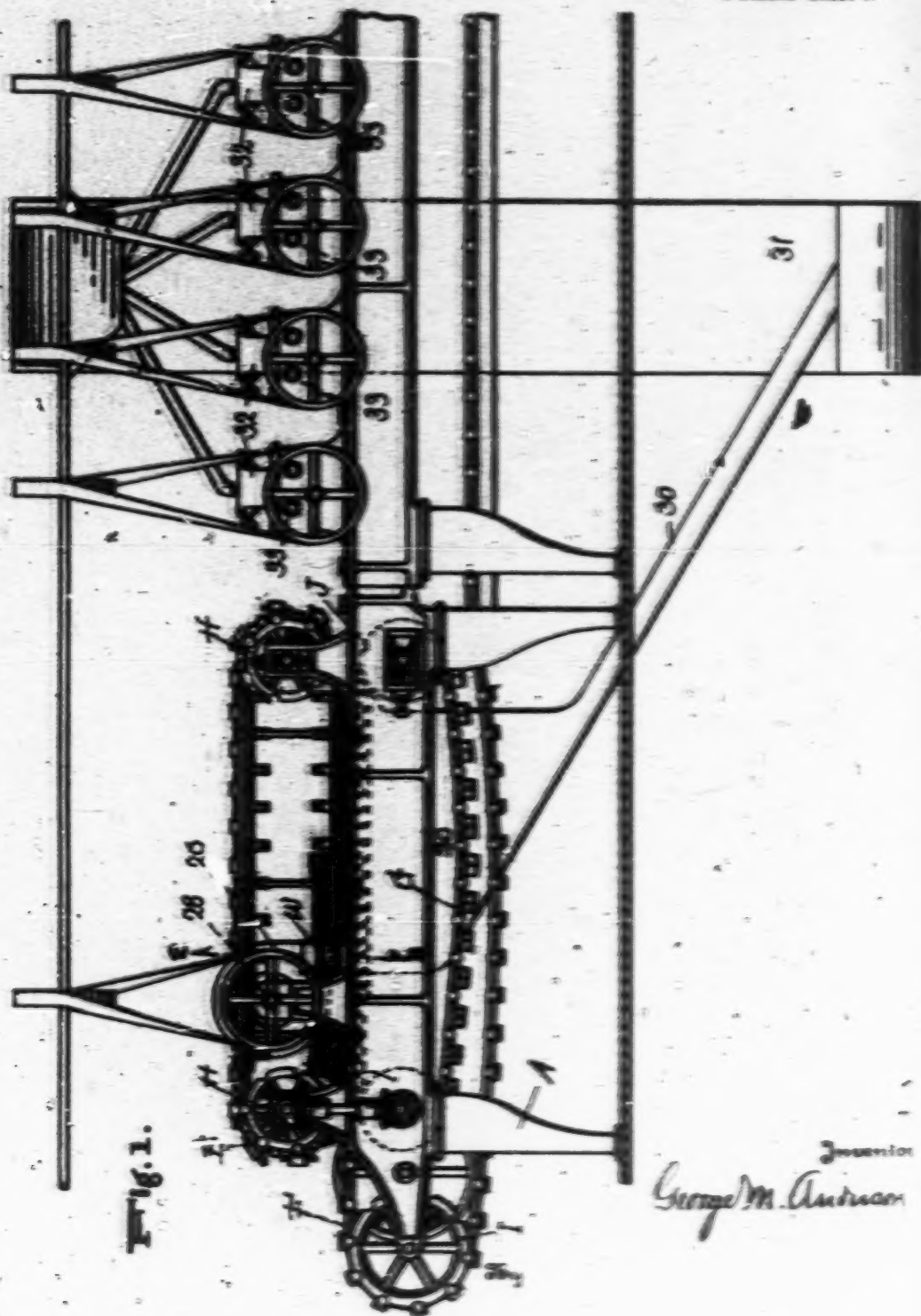
E. M. ANDERSON.

MACHINE FOR MANUFACTURING FILAMENTOUS DISCS.
APPLICATION FILED JULY 12, 1922.

1,834,429.

Patented Mar. 23, 1930.

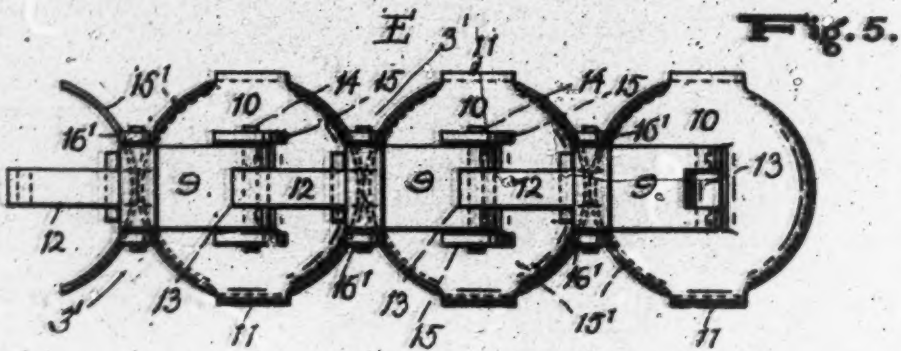
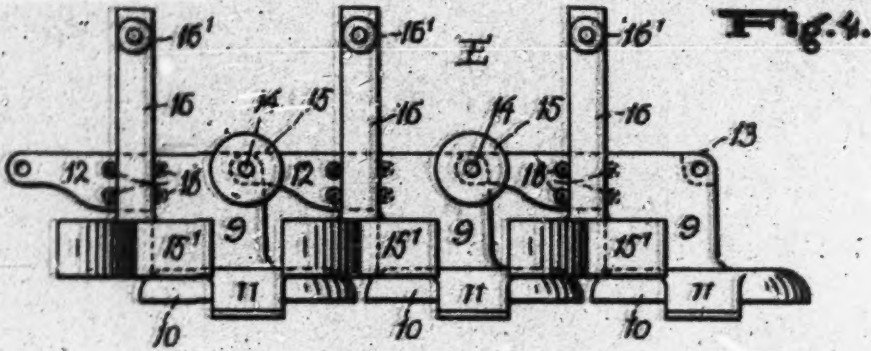
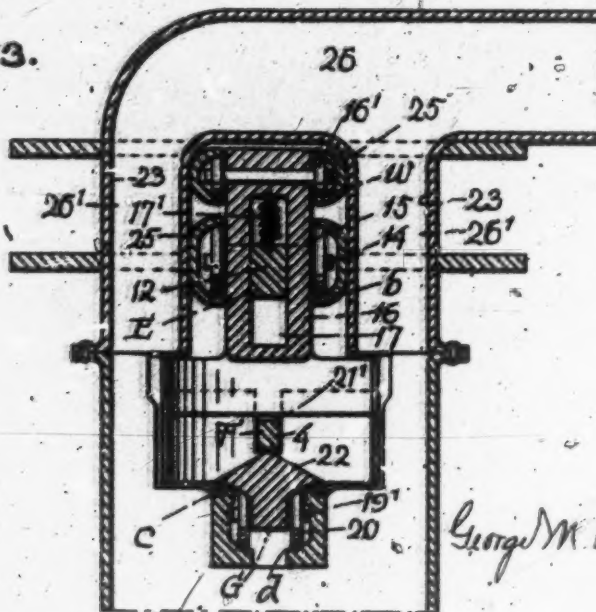
4 SHEETS—SHEET 1.



G. M. ANDERSON.
MACHINE FOR MANUFACTURING FILAMENTOUS BISCUITS.
APPLICATION FILED JULY 17, 1917.

1,834,429.

Patented Mar. 23, 1920.
4 SHEETS—SHEET 3.

**Fig. 3.**

Inventor
George M. Anderson

G. M. ANDERSON.
MACHINE FOR MANUFACTURING FILAMENTOUS BISCUITS.
APPLICATION FILED JULY 17, 1917.

1,884,429.

Patented Mar. 23, 1920.

4 SHEET-SHEET 1.

Fig. 6.

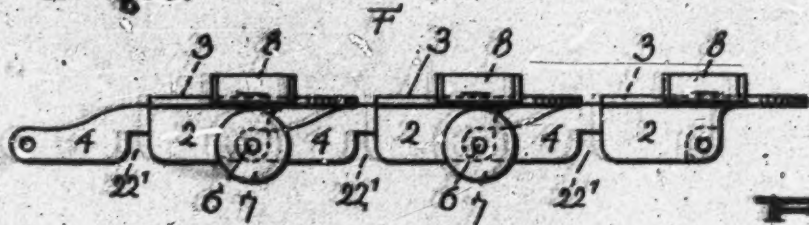


Fig. 7.

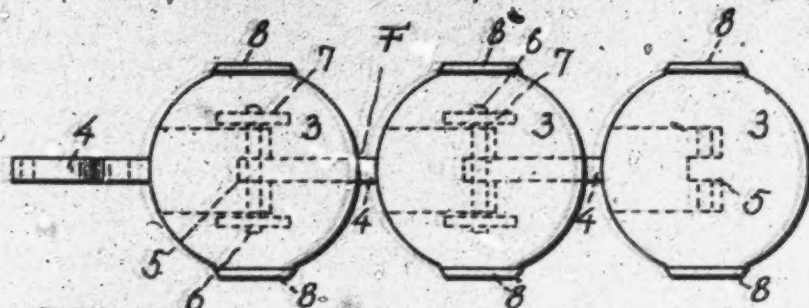


Fig. 8.

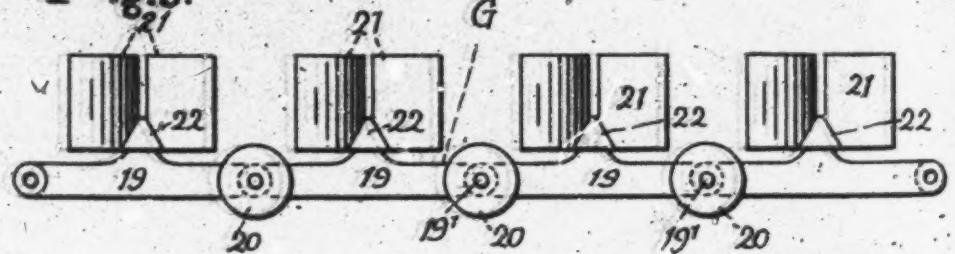
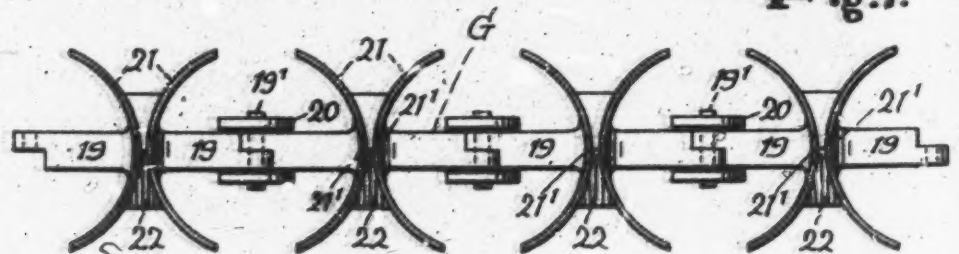


Fig. 9.



Inventor

George M. Anderson

UNITED STATES PATENT OFFICE.

GEORGE H. ANDERSON, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO THE
SHREDDED WHEAT COMPANY, A CORPORATION OF NEW YORK.

MACHINE FOR MANUFACTURING FILAMENTOUS BISCUITS.

1,884,429.

Specification of Letters Patent. Patented Mar. 23, 1920.

Application filed July 17, 1917. Serial No. 181,188.

To all whom it may concern:

Be it known that I, GEORGE H. ANDERSON, a citizen of the United States, resident of Washington, District of Columbia, have made a certain new and useful Invention in Machines for Manufacturing Filamentous Biscuit; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a side view of the invention as applied.

Fig. 2 is a section on the line 2—2, Fig. 1.

Fig. 3 is a similar view with the belts moved the length of half a link.

Fig. 4 is a detail side view of a section of the upper belt.

Fig. 5 is a plan view of the same.

Fig. 6 is a detail side view of a section of the middle belt.

Fig. 7 is a detail plan view of the same.

Fig. 8 is a detail side view of a section of the lower belt.

Fig. 9 is a detail plan view of the same.

The invention has relation to machines for manufacturing filamentous biscuit, wherein a continuous band of filaments is laid down from the shredding or reducing machines upon a moving carrier or belt, said band being usually transversely indented or cut in straight lines, the object of the present invention being the economical production of a round or rounded biscuit. In carrying out this object means are provided transversely dividing the band of filaments on curved or crooked lines, approximately triangular parts of the band of filamentous material being thereby cut away between the biscuit, means being provided to convey these cut-away portions of the filamentous band to the hoppers of the shredding machines, to be again used or shredded with other grain fed to said hoppers.

The invention consists in the novel construction and combinations of parts, as hereinafter set forth.

In the accompanying drawings, illustrating the invention, the letter A designates the frame of a machine for cutting the endless band of filaments into uniform sections, said machine shown and described generally in Letters Patent No. 681,656, dated August

27, 1901, and the present invention including certain modifications of this patented machine, as hereinafter explained. The frame A is provided with overlying tracks, 60 b, c and d, upon which the endless upper, middle and lower chain belts, E, F and G, respectively travel, said belts passing over end sprocket wheels H, I and J.

The middle belt F constitutes an endless sectional pan, having between the sections or links thereof narrow intervals for passage of the upper and lower cutter blades 15' and 21. The cutter blades 21 of the lower belt pass upwardly in succession between the sections of the middle belt, entering sufficiently therebetween to lift the filamentous material somewhat and to coact with the blades of the upper cutter belt.

The links 2 of the middle belt F each carry, rigidly connected therewith, a pan or receptacle 3, and are provided respectively with a reduced extension 4, the latter engaging at one end with a central seat 5 of the adjacent link, the links being pivoted together by transverse pins 6, located centrally of the pans 3 and carrying end rollers 7, traveling upon the tracks c. Each pan 3 is substantially circular and is provided with short lateral upwardly extending flanges 8.

The links 9 of the upper belt E each carry, rigidly connected therewith, a depending cover plate 10, overlying and of similar form to that of the pan 3 corresponding thereto, said cover plate having downturned lateral flanges 11, of similar dimensions to and cooperating with the flanges 8 as hereinafter stated. Each link 9 is provided with a reduced extension 12, engaging at one end with a central seat 13 of the adjacent link, the links being pivoted together by transverse pins 14, located centrally of the cover plates and having end rollers 15, traveling upon the tracks b.

The arcuate knives 15' of the upper belt are connected in pairs, each pair to a vertical stem or shank 16, said shank provided with a horizontal slot 17, the latter being engaged by the reduced extension 12 of a link 9, there being one pair of knives to each said link. The shank 16 has vertical reciprocatory movement in a suitable guideway of the link 9, said guideway usually formed by rollers 18, carried by said link. The arcuate knives 15' are concentric with and overlie the arcuate spaces between the pans 3.

The links 19 of the lower cutter belt G are pivoted together by transverse pins 19', carrying rollers 20, traveling upon the tracks d, and each link carries a pair of arcuate knives 21, cooperating with the knives 15' of the upper belt in cutting the biscuit.

The cover plates 10 of the upper belt E are preferably rounded or beveled at the margins, to gather the filamentous material somewhat and give it shape as it passes thereon in its downward movement. At the adjacent edges of the sections this marginal bevel of the cover plates serves to compress the filamentous material against the rising blades of the lower knives 21, in this manner facilitating the action of the knives of the upper belt in their descent, the upper and lower knives having a shearing action.

The upper and lower cutter blades or knives will, in the cutting operation, inclose each biscuit, except at the portions of the sides bounded by the flanges 8 and 11, these flanges inclosing each portion of the biscuit, which is in this way entirely inclosed and guarded against the blast hereinafter described.

In order to effect the reciprocation of the cutter blades of the upper belt, inclined or cam tracks e are provided, above the track b. In the operation of the machine, rollers 16' of the knife shanks of the upper belt will enter the cam tracks end, traveling downwardly therein, will depress the knives 15 to make the cut, and then raise said knives, withdrawing the same from the filamentous material. The upper knives are held normally in raised position by springs 17'.

The three endless belts travel at the same rate of speed, and are accurately formed and geared, in order that the action of the upper and lower knives shall be neat and close.

The filamentous material laid down upon the middle belt F by the reducing machines will fill the pan sections of the belt and will bridge the narrow tapering spaces 3' between the pan sections.

The tracks c and d, whereon travel the rollers of the middle and lower belts, as also the links of these belts, are of a breadth considerably less than the width of the pans 3 and of the filamentous band from which the biscuit are cut, so that the triangular pieces cut from said band in the making of the rounded biscuit will have their descent or fall facilitated. Transverse inclined bridge blocks 22 are located between the knives 21 of the lower belt G, and are of a breadth (or length transversely) somewhat in excess of the breadth of the tracks c and d and the links of the belts traveling thereupon, whereby the filamentous material deposited between the pans 3 of the middle belt and cut from between the rounded biscuit, will in falling be directed outwardly and enabled to drop freely. In the rise of

the lower knives 21, the bridge blocks 22 between said knives engage lower notches 22' of the reduced extensions 4 of the middle belt, said notches having rounded lower corners. In this way the lower knives are accurately guided in making the cut. The reduced extensions 4 of the links 2 of the middle belt F fit within central upper notches 21' of the knives 21 of the lower belt G.

The spaces at each side of the belts E and F are closed in at the outer sides by vertical walls 23, and the upper cutter belt and its knives are inclosed at 25, forming a blast chamber 26, located at the lower part of the cam tracks e and through the branches 26' of which a blast of air is delivered by fan 28. This blast chamber extends downwardly at both sides of the overlying belts, and the breadth of the track b and of the links of the belt traveling thereon being less than the width of the pans 3, the branches of the blast chamber overlie the lateral margins of the biscuit and of the filamentous band. The blast chamber 26 is suitably closed in at the ends.

Located below the blast chamber 26 is a chute 30, also suitably closed in at the sides and ends, and through which the blast of the fan will carry the triangular pieces of the filamentous band cut from between the rounded biscuit, as also all loose filaments or scrap material located upon the belts and outside the lines of the inclosed biscuit, and, being assisted by gravity, will convey these pieces and material to an elevator 31, whereon they will be deposited and carried upwardly, being delivered from said elevator to the hoppers 32 of the reducing machines 33.

I claim:

1. In a machine for manufacturing filamentous biscuit, means for reducing the material to filaments, a moving carrier upon which the filaments are deposited in a continuous band, means for cutting said band transversely to form the biscuit, and waste removing means operating simultaneously with the cutting means for directing a blast of air downwardly at each side of that portion of the band engaged by the cutting means.

2. In a machine for manufacturing filamentous biscuit, means for reducing the material to filaments, a moving carrier upon which the filaments are deposited in a continuous band, means for cutting said band transversely to form the biscuit and for covering and protecting the biscuit, and waste removing means operating simultaneously with the cutting means for directing a blast of air downwardly at each side of that portion of the band engaged by the cutting means.

3. In a machine for manufacturing fila-

mentous biscuit, means for reducing the material to filaments, an endless carrier chain belt having pans upon which the filaments are deposited in a continuous band, an upper endless chain belt having covers for said pans, a lower endless cutter belt, upper cutters carried by the cover belt, and waste removing means operating simultaneously with the cutters for directing a blast of air downwardly at each side of that portion of the band engaged by the cutters.

4. In a machine for manufacturing filamentous biscuit, means for reducing the material to filaments, an endless carrier chain belt having pans upon which the filaments are deposited in a continuous band, an upper endless chain belt having covers for said pans, a lower endless cutter belt, upper cutters carried by said cover belt, lateral tracks for the carrier belt, the cover belt, the lower cutter belt and the upper cutters all located within the lateral bounding edges of the links of said belts, and waste removing means operating simultaneously with the cutters for directing a blast of air downwardly at each side of that portion of the band engaged by the cutters.

5. In a machine for manufacturing filamentous biscuit, means for reducing the material to filaments, an endless carrier chain belt having pans upon which the filaments are deposited in a continuous band, an endless chain belt having covers for said pans, a lower endless cutter belt, upper cutters carried by the cover belt, lateral tracks for the carrier belt, the cover belt, the lower cutter belt and the upper cutters all located within the lateral bounding edges of the links of said belts, a housing for the tracks

of the cover belt and the upper cutters, the pans of the carrier belt projecting laterally over and covering the tracks thereof, and waste removing means operating simultaneously with the cutters for directing a blast of air downwardly at each side of that portion of the band engaged by the cutters.

6. In a machine for manufacturing filamentous biscuit, means for reducing the material to filaments, an endless carrier chain belt having pans upon which the filaments are deposited in a continuous band, an endless chain belt having covers for said pans, a lower endless cutter belt, upper cutters carried by the cover belt, lateral tracks for the carrier belt, the cover belt, the lower cutter belt and the upper cutters all located within the lateral bounding edges of the links of said belts, a housing for the tracks of the cover belt and the upper cutters, the pans of the carrier belt projecting laterally over and covering the main portions of the tracks thereof and of the lower cutter belt, the last named belt having inclined bridge means between the links thereof and projecting over and covering the tracks thereof and of the carrier belt at points between the links of both belts, and waste removing means operating simultaneously with the cutters for directing a blast of air downwardly between the links of the carrier belt and at each side of that portion of the filamentous band engaged by the cutters.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE M. ANDERSON.

Witnesses:

W. R. BAUM,
STUART HILDER.

July 13, 1926.

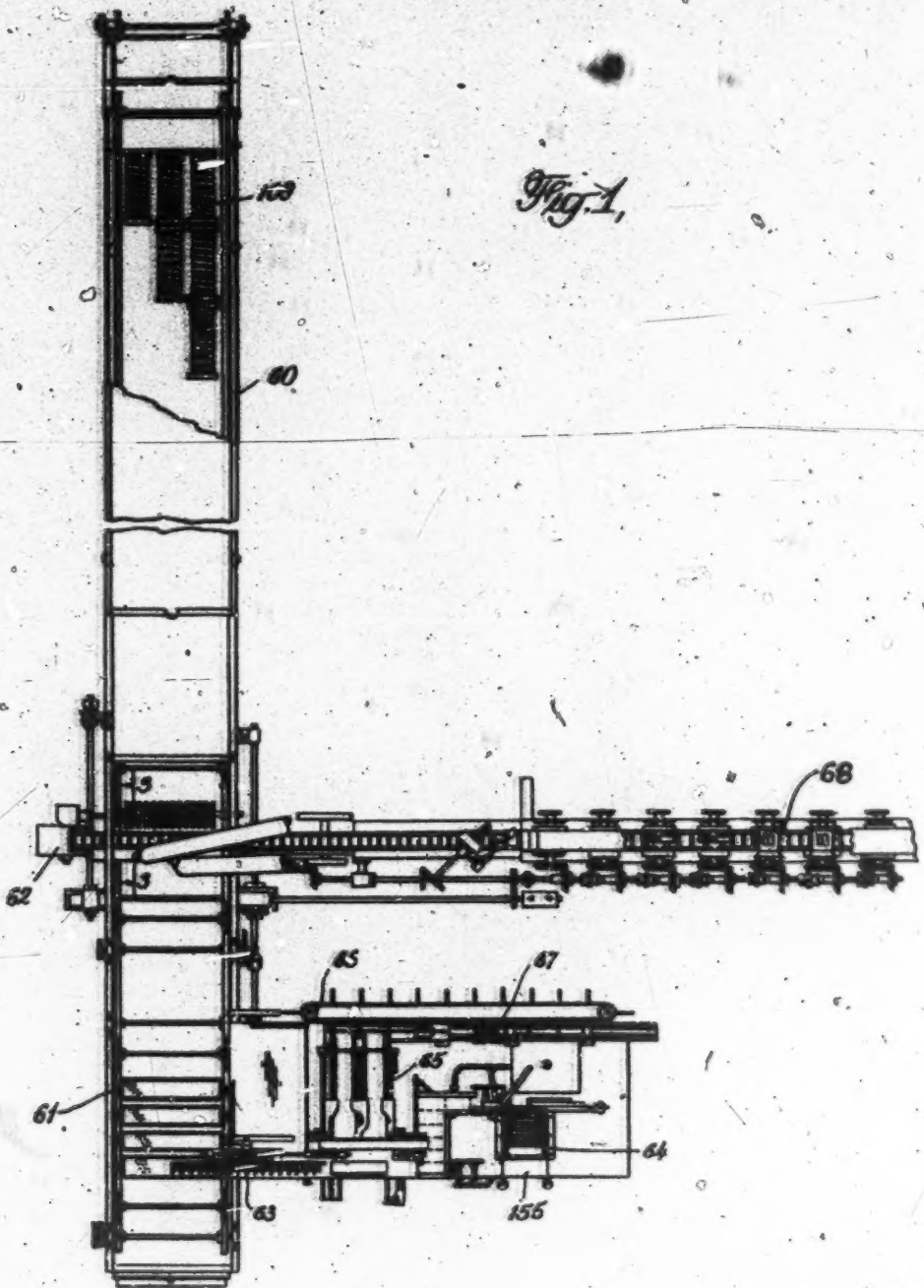
H. A. HOUSE

1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheets-Sheet 1



INVENTOR
 HENRY A. HOUSE
 BY *Perme, Davis, Harlow & Thoms*
 ATTORNEYS

July 13, 1926.

H. A. HOUSE

1,582,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

15 Sheets-Sheet 2

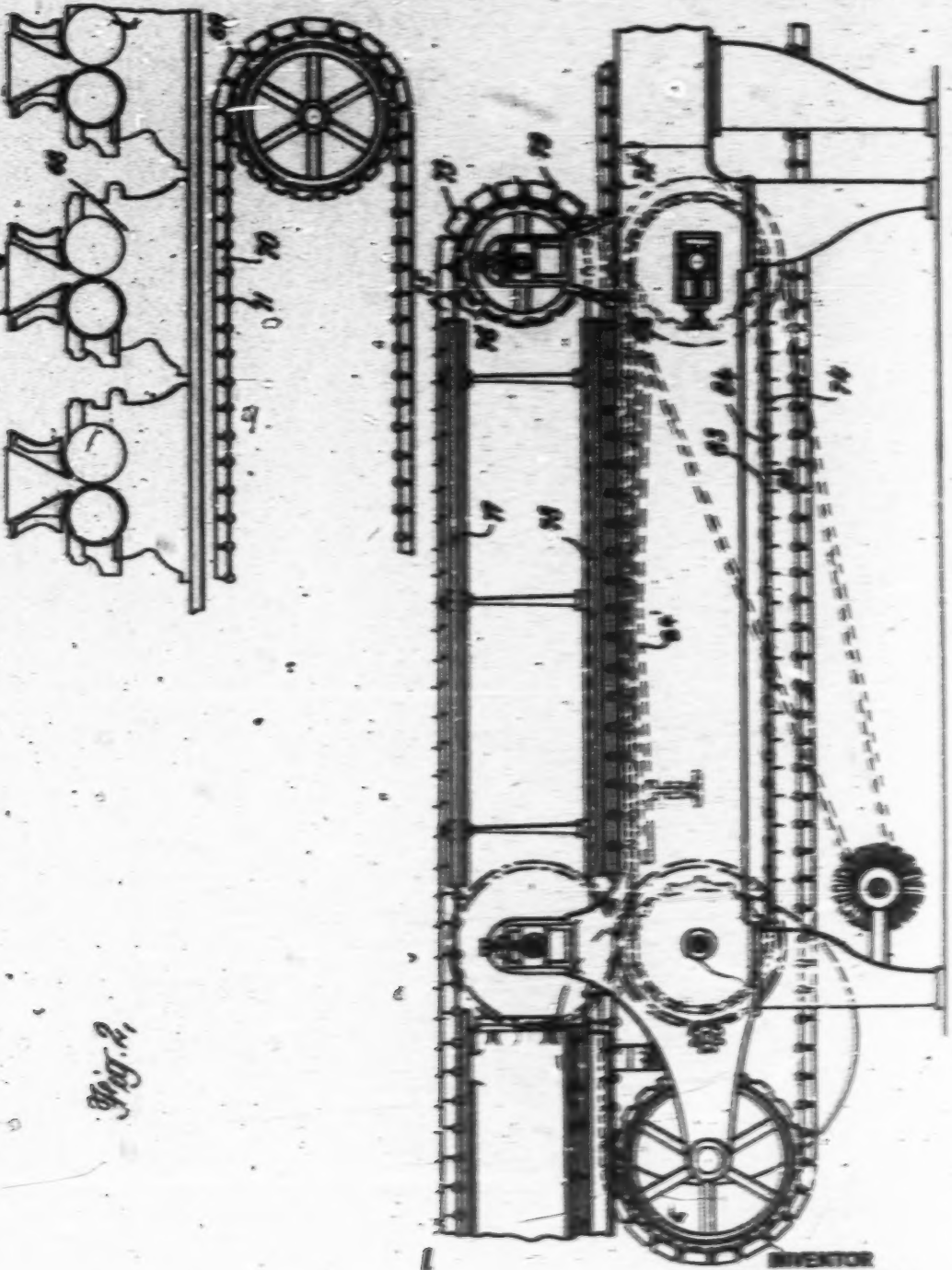


Fig. 2.

INVENTOR
HENRY A. HOUSELawrence J. House & Son
ATTORNEYS

July 13, 1926.

H. A. HOUSE

1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheets-Sheet 3

Fig. 3,

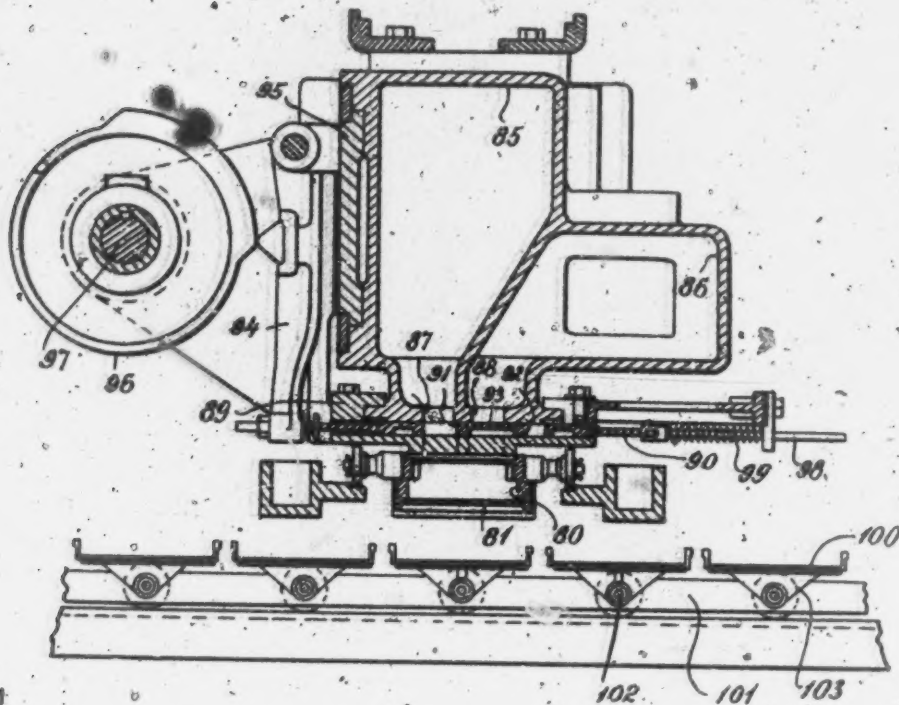
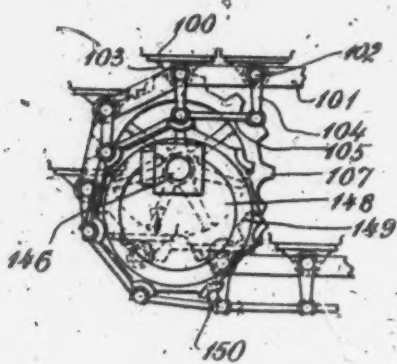


Fig. 5,

INVENTOR
HENRY A. HOUSEBY
Reynolds, Davis, Thayer & Edwards
ATTORNEY

July 13, 1926.

H. A. HOUSE

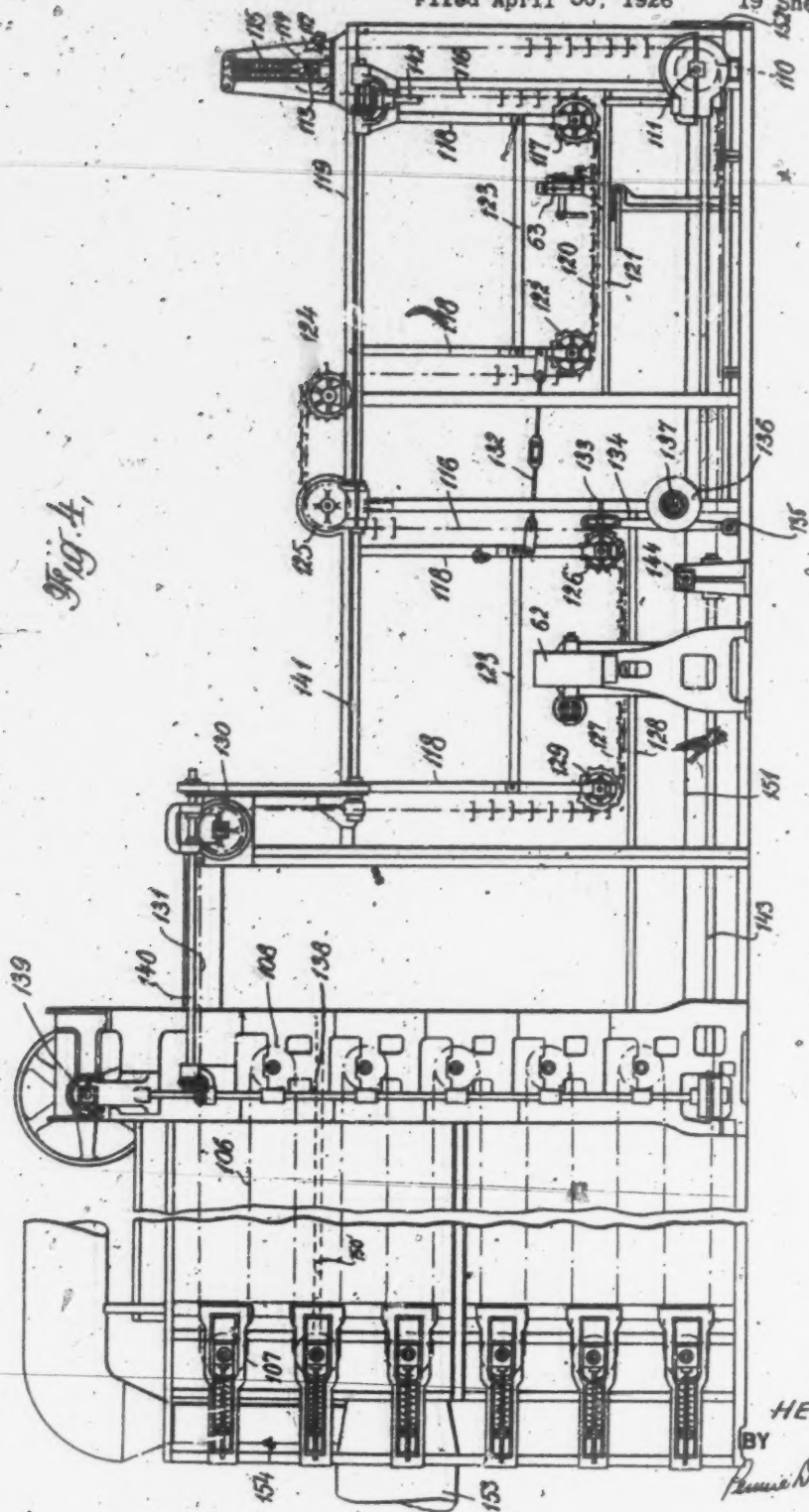
1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheets-Sheet 4

Fig. 4,



INVENTOR
HENRY A. HOUSE

BY
Reuben D. Mearns
ATTORNEYS

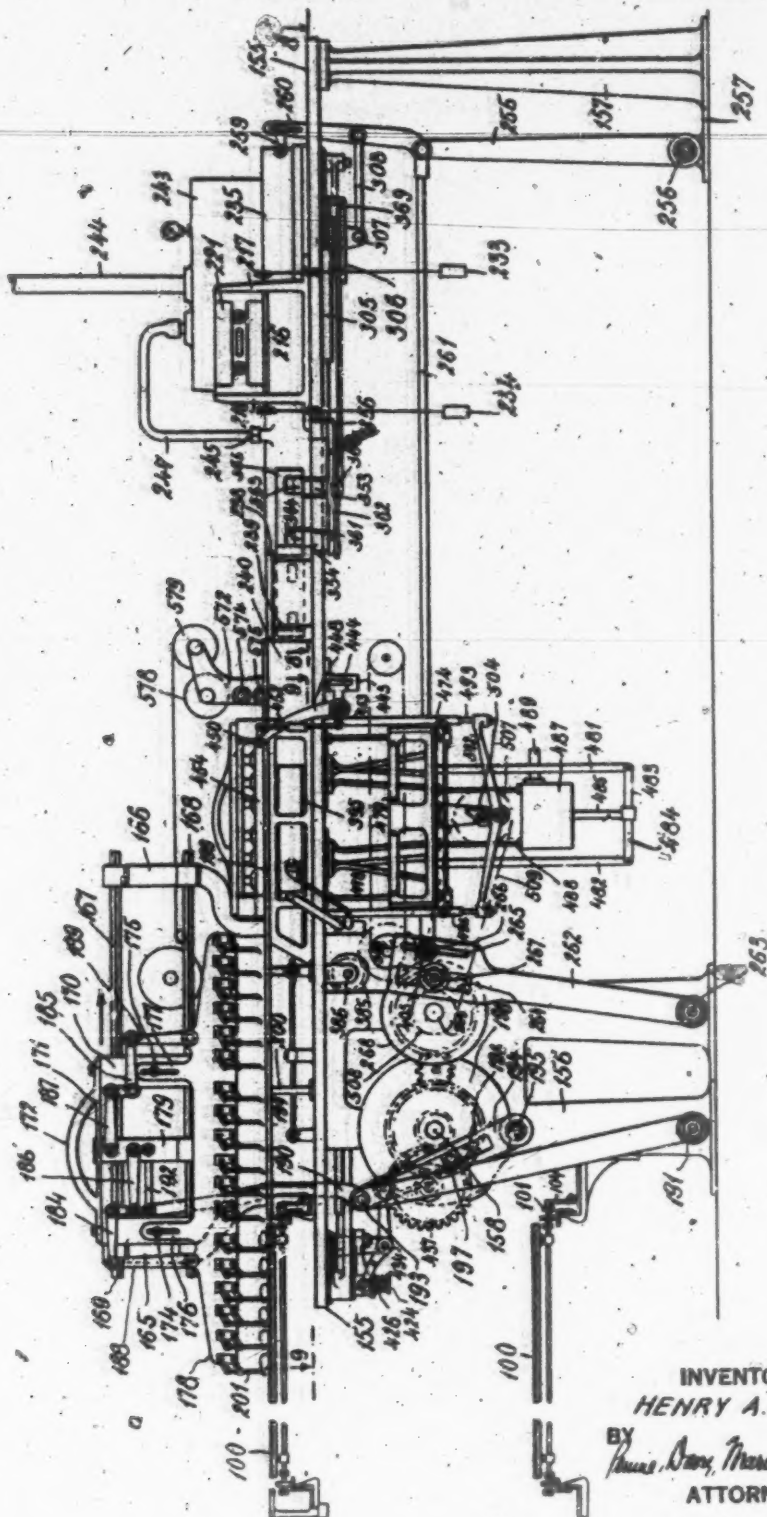
1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19. Sheets-Sheet 5

Fig. 6,



INVENTOR
HENRY A. HOUSE

BY *James D. Moore & Lincoln*
ATTORNEYS.

July 13, 1926.

H. A. HOUSE

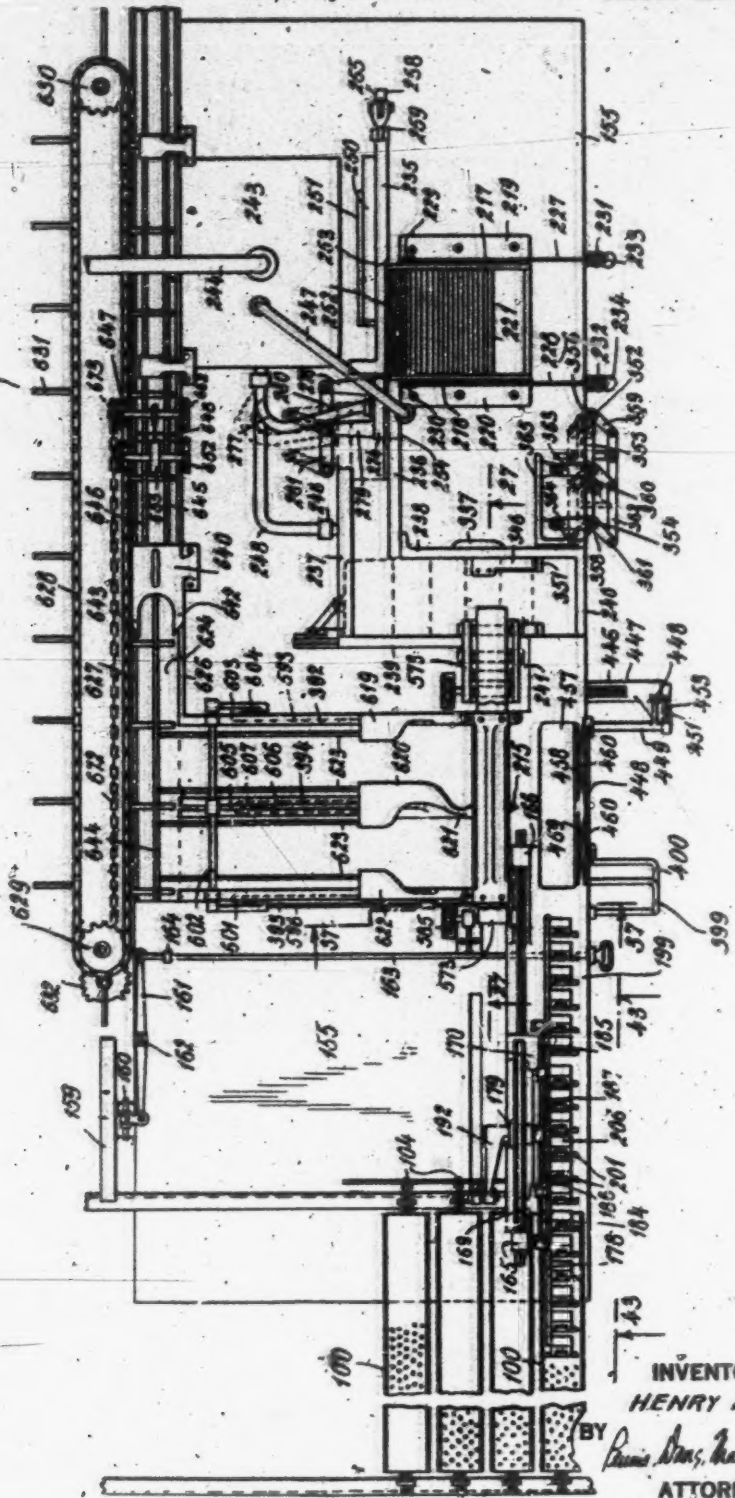
1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheets-Sheet 6

Fig. 7.



INVENTOR
HENRY A. HOUSE
BY *Reinhold Messers, Messers. Gump*
ATTORNEYS

July 13, 1926.

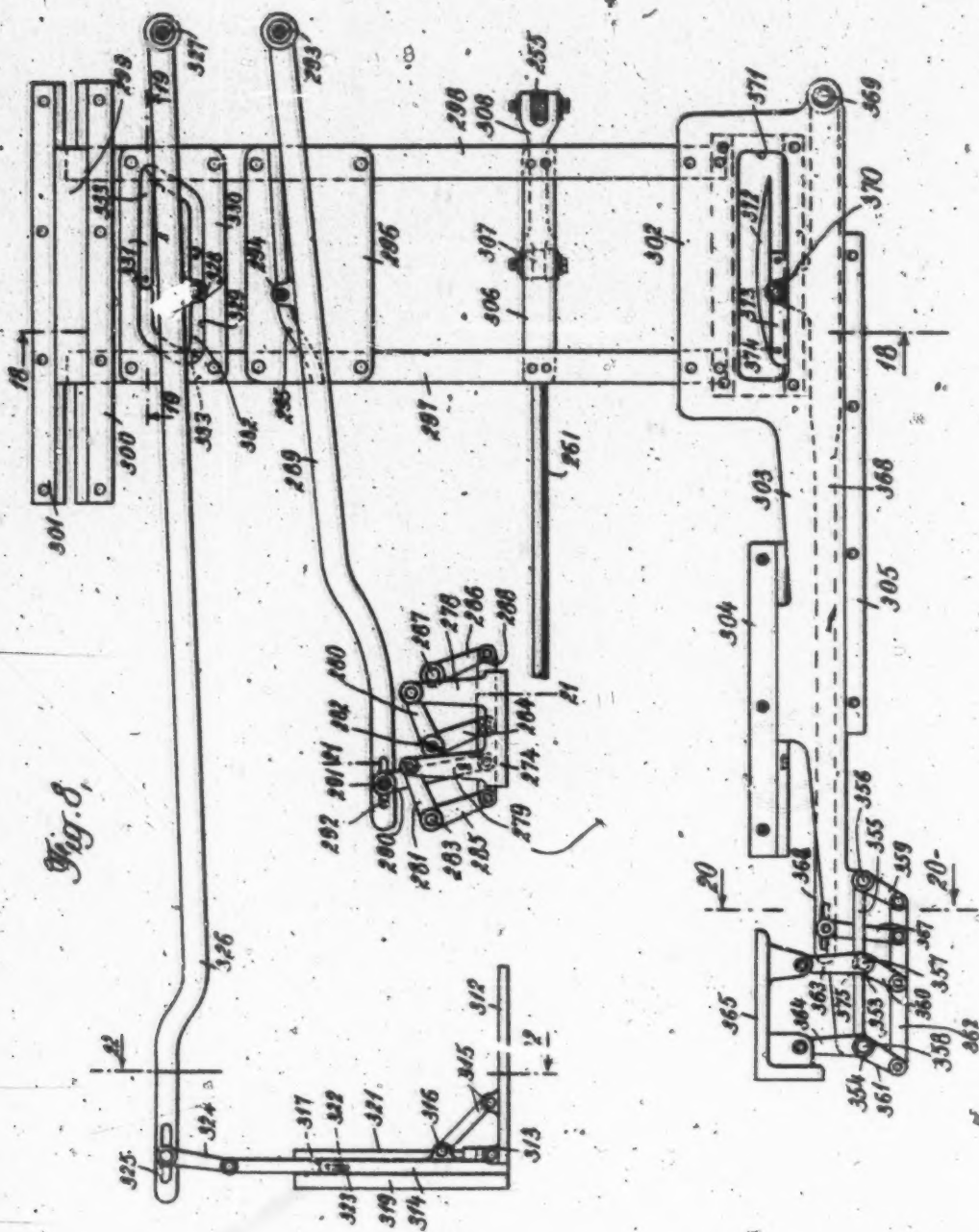
H. A. HOUSE

1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheets-Sheet 7

INVENTOR
HENRY A. HOUSEBY *James D. Martin & Edwards*
ATTORNEYS

July 13, 1926.

H. A. HOUSE

1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926. 19 Sheets-Sheet 8

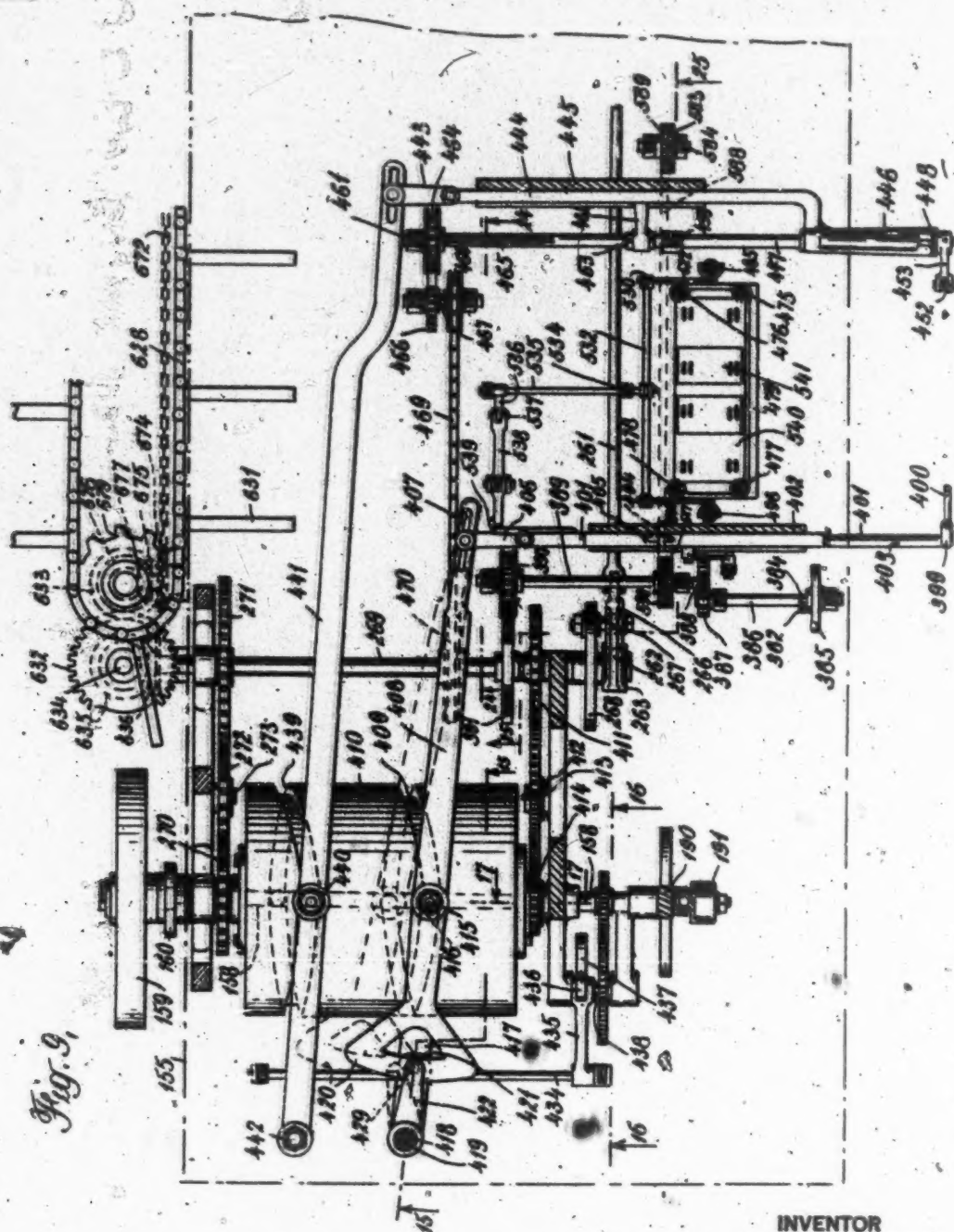


Fig. 9.

INVENTOR
HENRY A. HOUSEBY
Reinhold, Wier, & Parsons
ATTORNEYS

July 13, 1926.

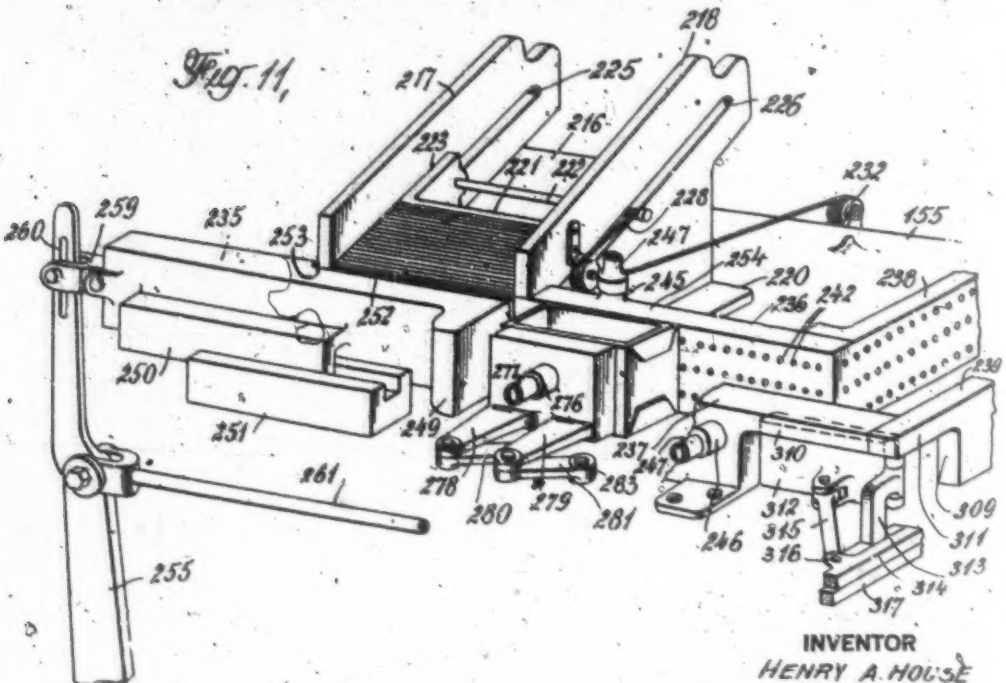
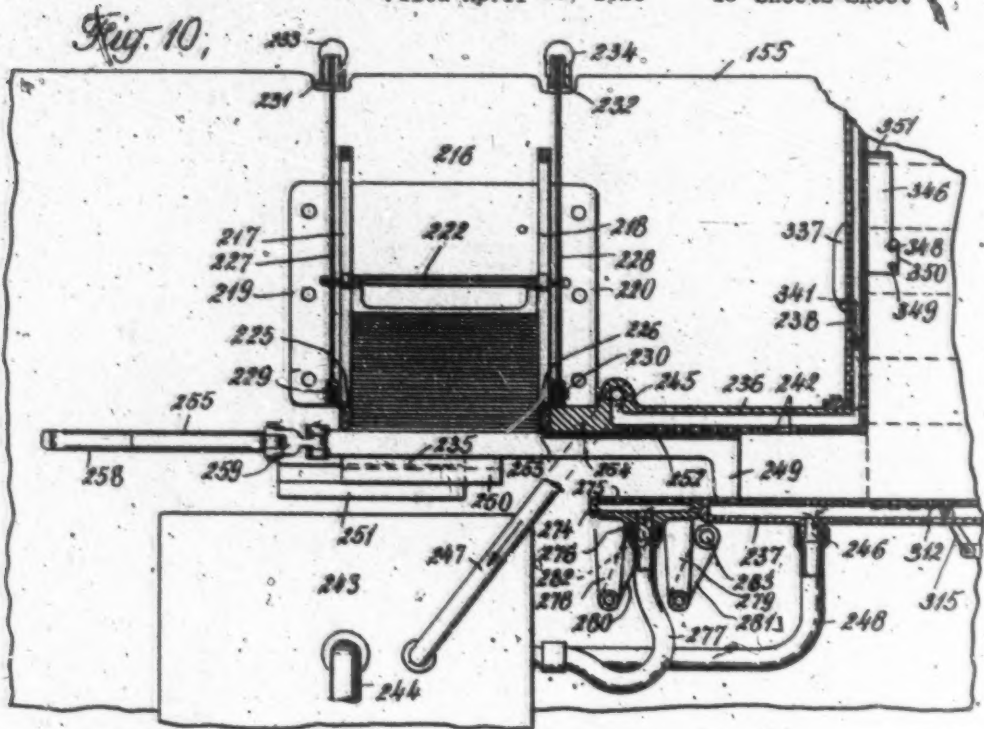
H. A. HOUSE

1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheets-Sheet 9



INVENTOR

HENRY A. HOUSE

BY

Reinhold, Davis, Harrison & Edwards
ATTORNEYS

July 13, 1926.

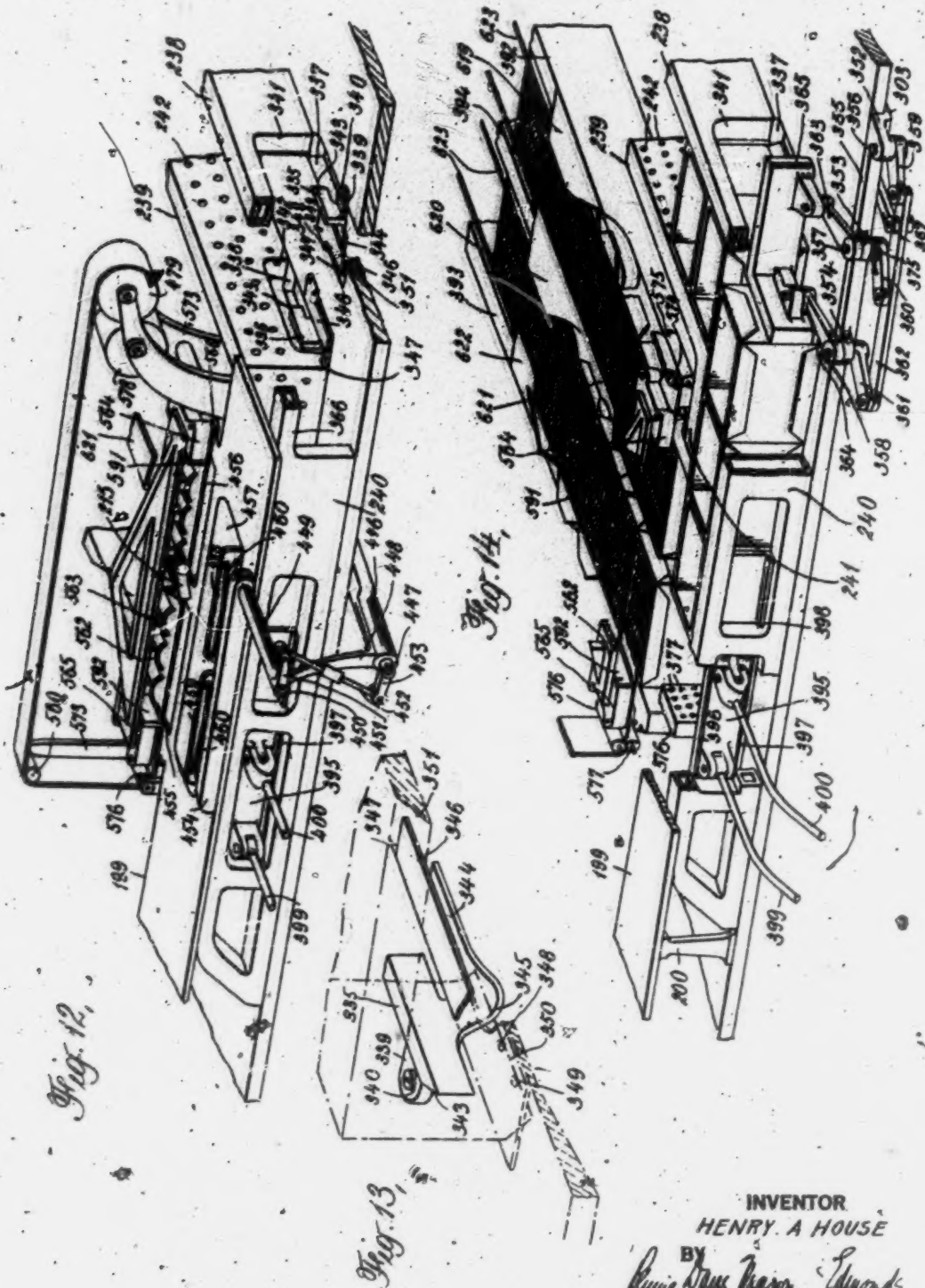
H. A. HOUSE

1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheets-Sheet 10

INVENTOR
HENRY A. HOUSEBY
Rennie W. Brown, Edmunds
ATTORNEYS

July 13, 1926.

H. A. HOUSE

1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheets-Sheet 11

Fig. 15,

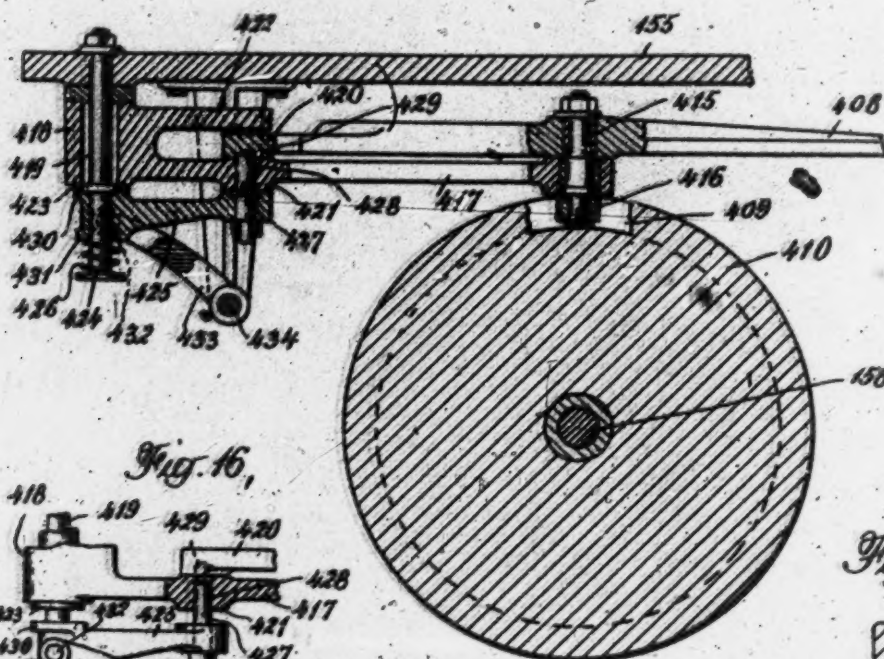


Fig. 16,

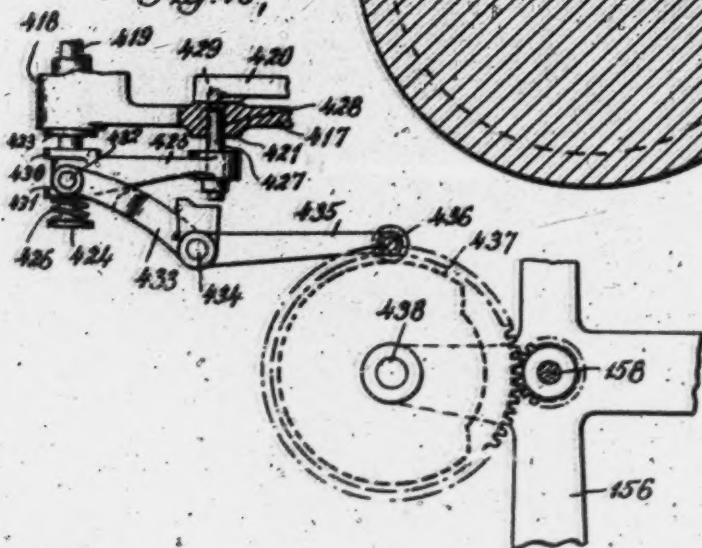
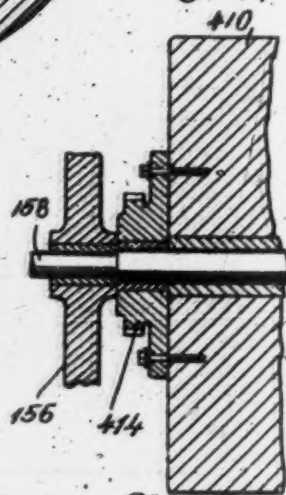


Fig. 17,

INVENTOR
HENRY A. HOUSEBY *James D. Edwards*
ATTORNEYS

July 13, 1926.

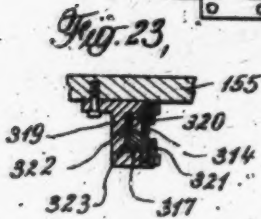
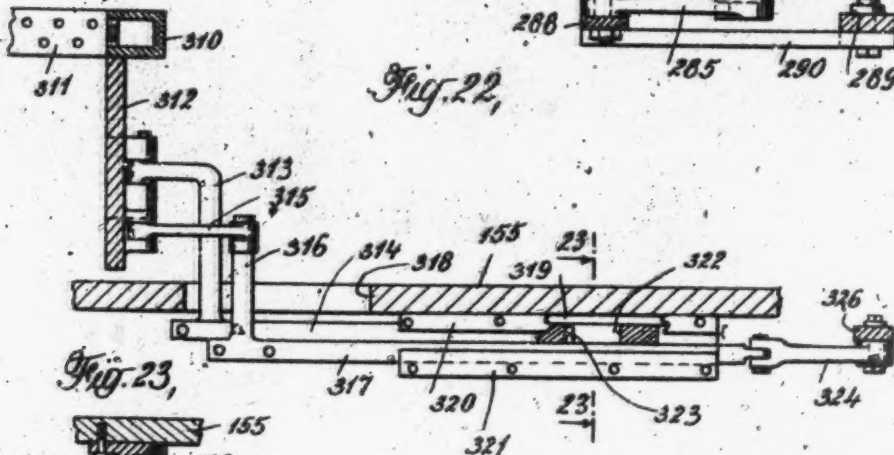
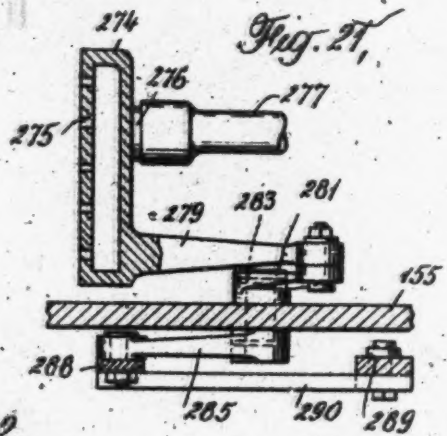
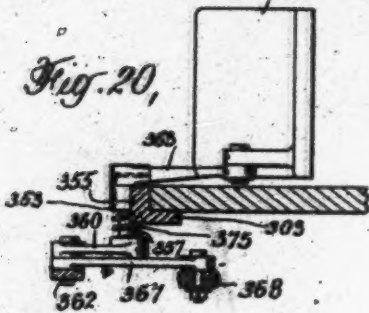
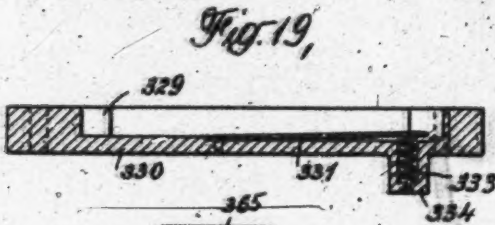
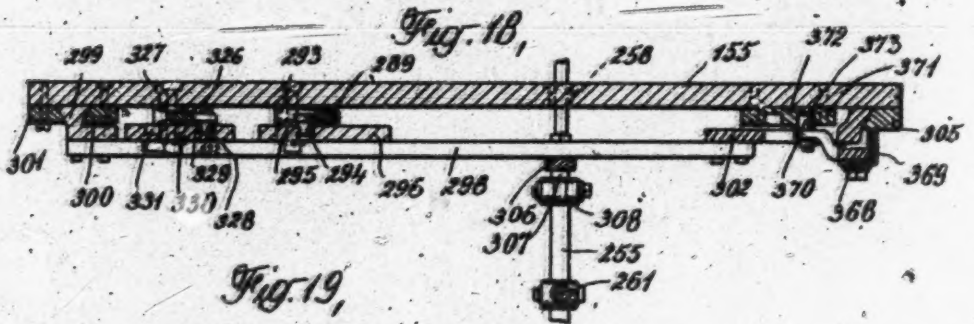
H. A. HOUSE

1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheets-Sheet 12

INVENTOR
HENRY A. HOUSEBY
Rena. Ross, Maria. Elmont
ATTORNEYS

7

7

July 13, 1926.

H. A. HOUSE

1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheets-Sheet 13

Fig. 24,

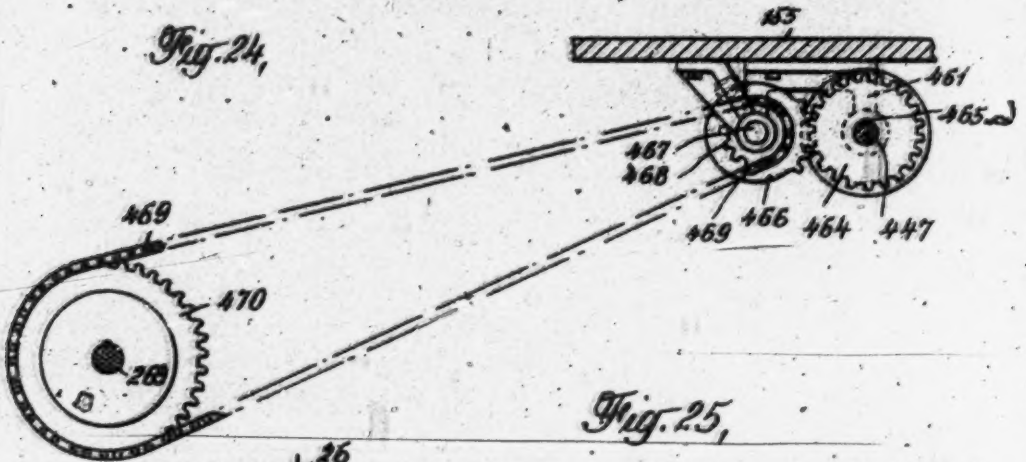


Fig. 25,

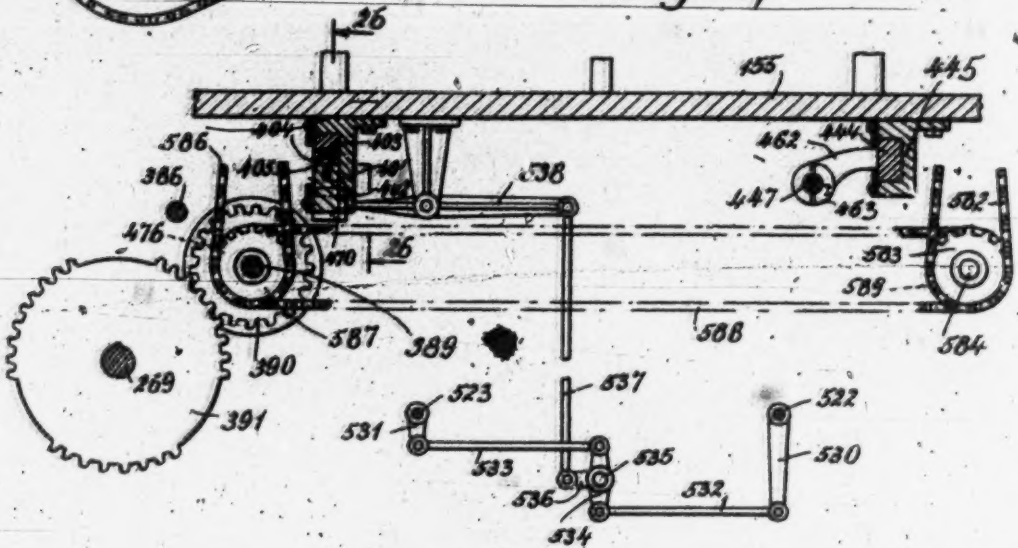
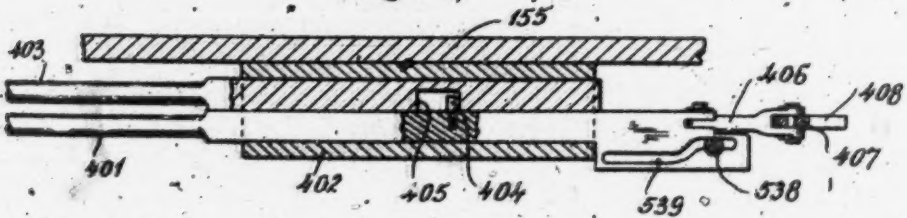


Fig. 26,

INVENTOR
HENRY A. HOUSEBY *James Davis, Harry Edwards*
ATTORNEYS

July 13, 1926.

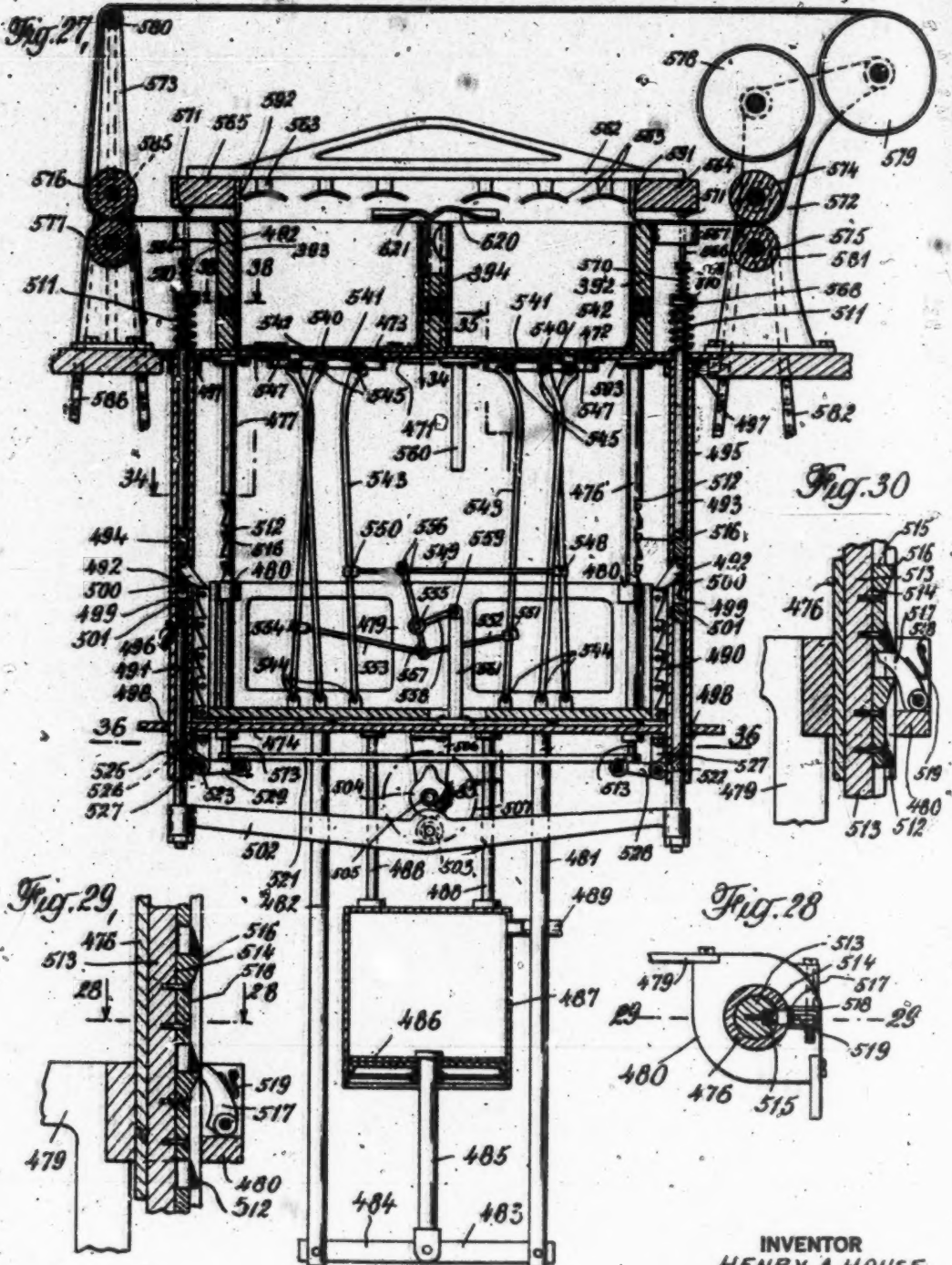
H. A. HOUSE

1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheets-Sheet 14

INVENTOR
HENRY A. HOUSEBY
Rus. Maron Edward
ATTORNEYS

July 13, 1926.

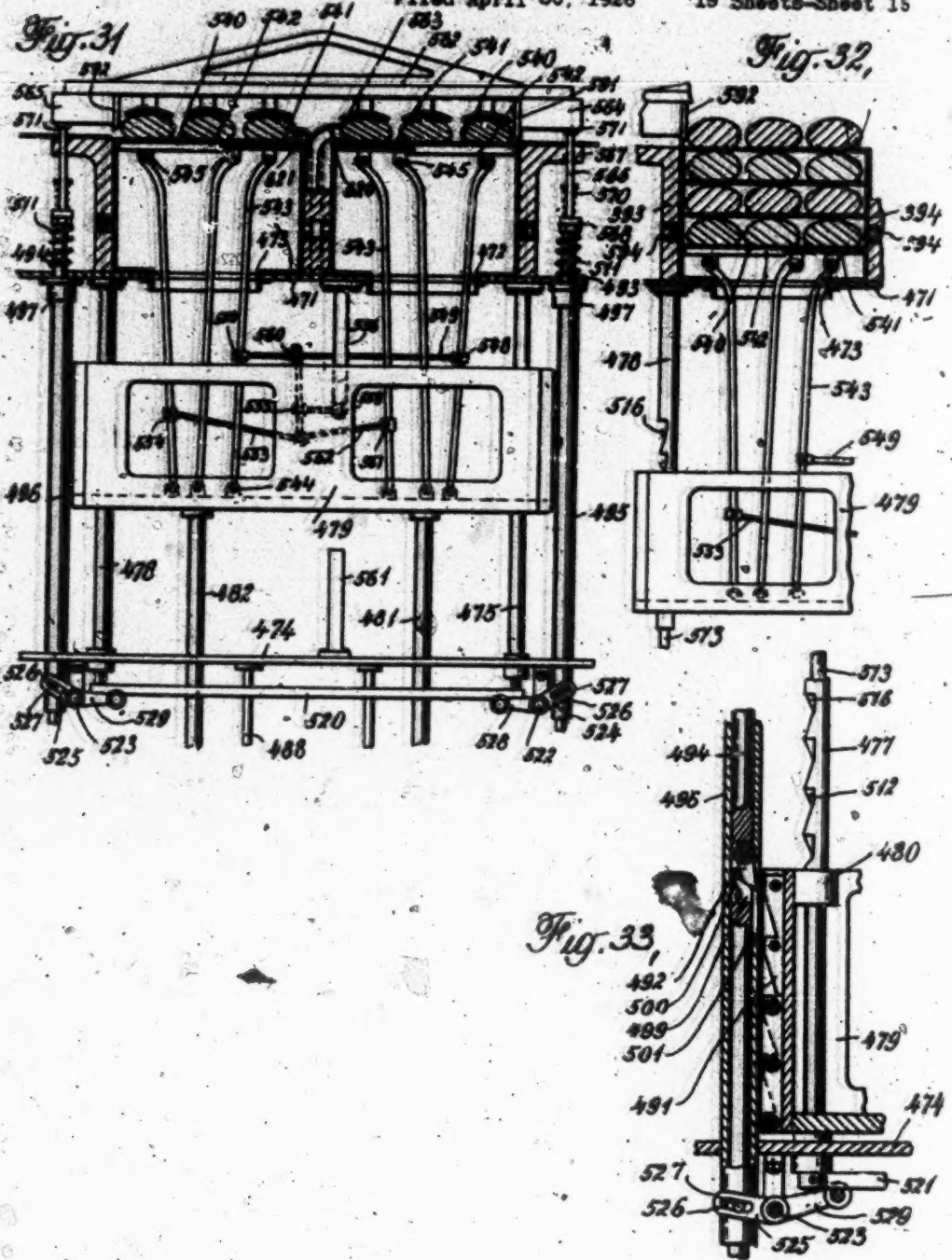
H. A. HOUSE

1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheets-Sheet 15



INVENTOR
HENRY A. HOUSE

BY *Rein. Dyer, Marvin. Thoms*
ATTORNEYS

July 13, 1926.

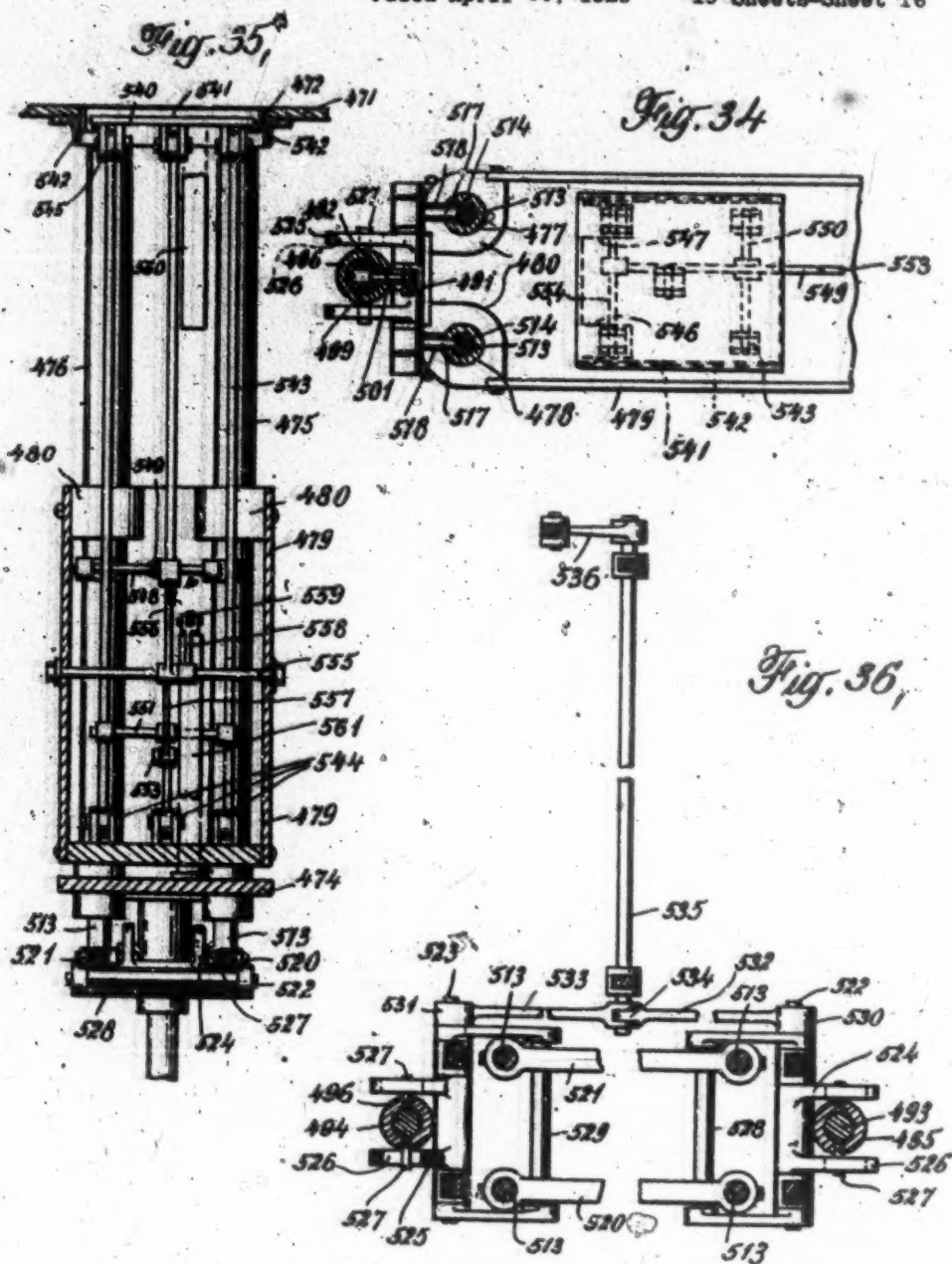
H. A. HOUSE

1,592,765

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheets-Sheet 16

INVENTOR
HENRY A. HOUSEBY *James M. Harris*
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July 13, 1926.

H. A. HOUSE

1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

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Fig. 37.

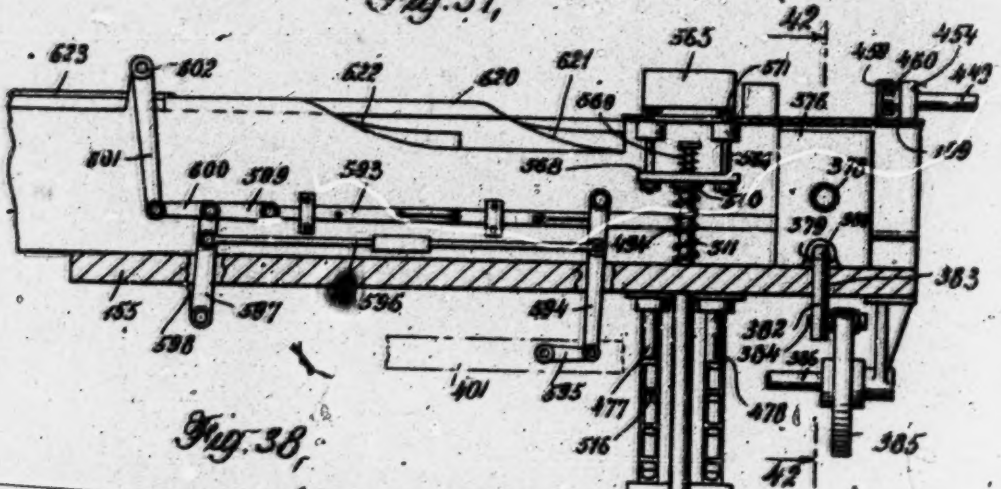


Fig. 38.

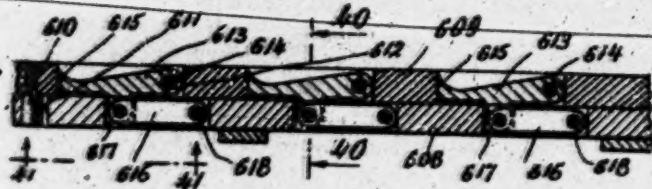


Fig. 39.

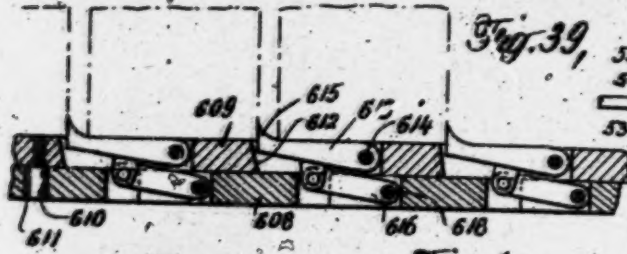
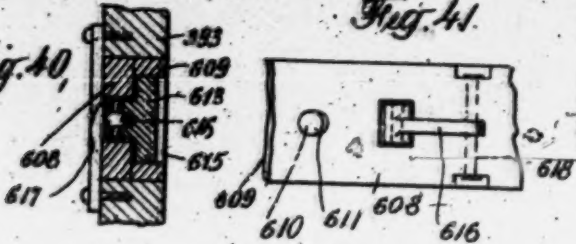


Fig. 41.

Fig. 40.



INVENTOR
HENRY A. HOUSE
BY
Rumr. & Sons, New York
ATTORNEYS

July 13, 1926.

H. A. HOUSE

1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheet, Sheet 18

Fig. 42,

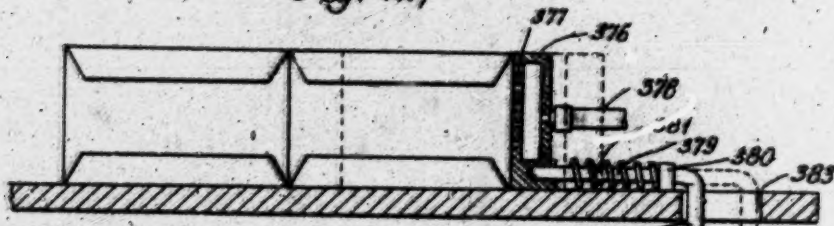


Fig. 46,

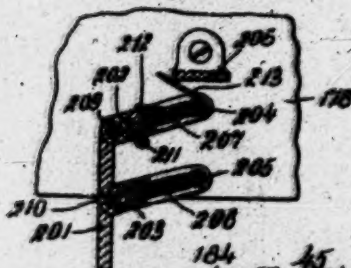


Fig. 47,

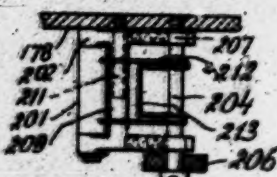


Fig. 43,

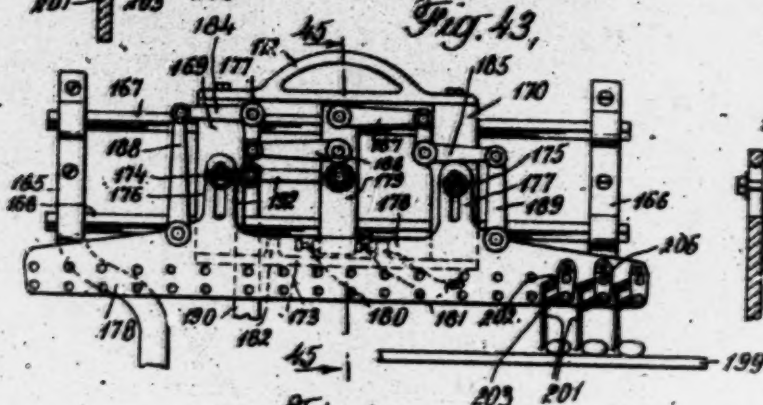


Fig. 45,

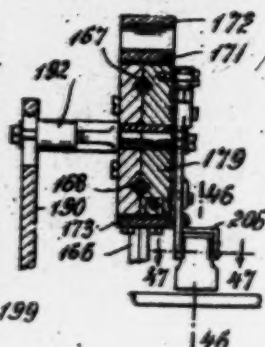
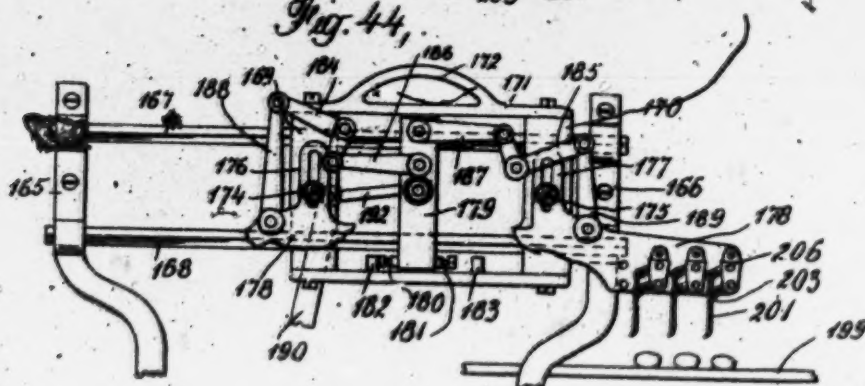


Fig. 44,

INVENTOR
HENRY A. HOUSEBY
Perry, Davis, Mason & Edwards
ATTORNEYS

July 13, 1926.

H. A. HOUSE

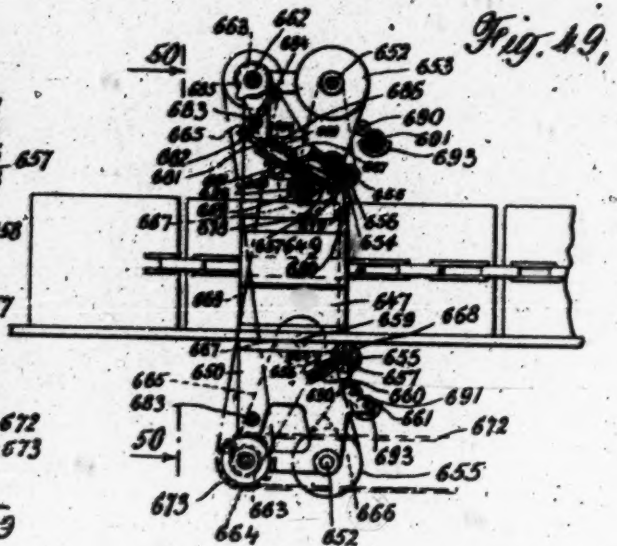
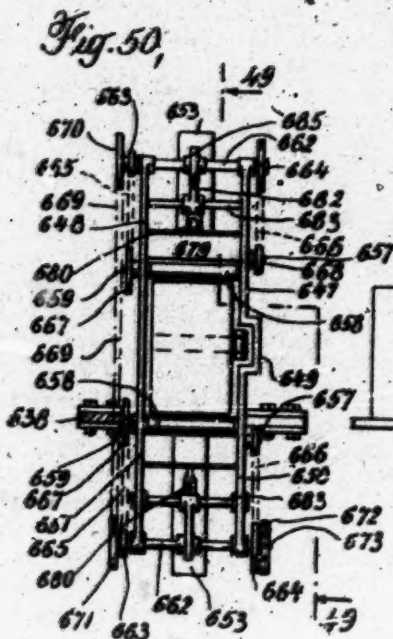
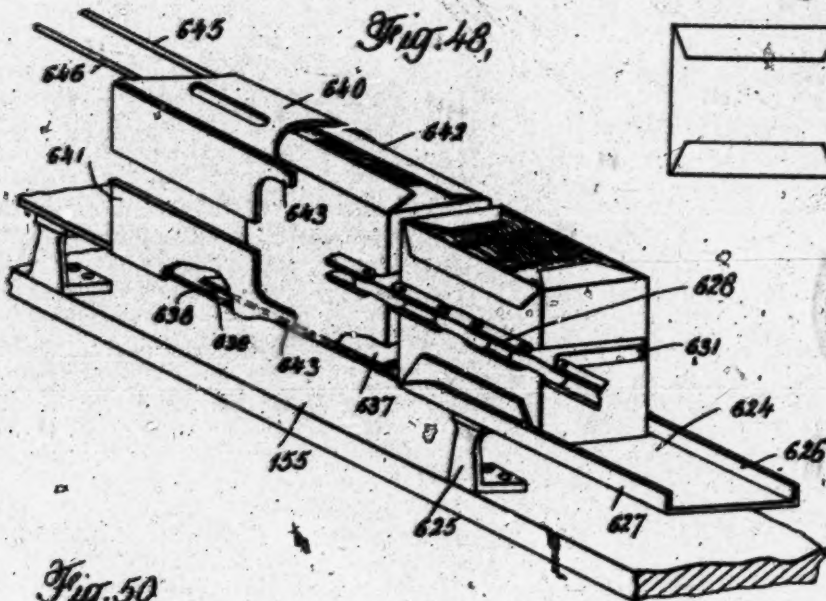
1,592,768

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD

Filed April 30, 1926

19 Sheets-Sheet 19

Fig. 51,



INVENTOR
HENRY A. HOUSE

BY
Lawrence Davis, Marvin Shantz
ATTORNEYS

Patented July 13, 1926.

UNITED STATES PATENT OFFICE.

HENRY ALONZO HOUSE, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE SHREDDED WHEAT COMPANY, OF NIAGARA FALLS, NEW YORK, A CORPORATION OF NEW YORK.

MACHINE FOR MANUFACTURING AND PACKING ARTICLES OF FOOD.

Application filed April 30, 1926. Serial No. 105,683.

This invention relates to the manufacture of articles of food, such as cereal biscuits, and has to do more particularly with automatic apparatus for performing the several operations involved in producing the articles and packing them in selected quantities in sealed cartons ready for commercial distribution. The apparatus, while capable of use in the manufacture of numerous products, is especially adapted for the production of cereal filamentous biscuits of the shredded wheat type, and a form of the apparatus suitable for that product will be described, although it is to be understood that this use is merely by way of example.

In the manufacture of cereal biscuits as now practiced, numerous manual operations are required. For example, the biscuits formed from the cereal grain by appropriate devices are deposited upon trays which are conveyed to the baking ovens where the trays are inserted in and removed from the ovens manually by the bakers. Then, in a further manual operation, the trays of baked biscuits are caused to traverse a heated chamber wherein the biscuits are thoroughly dried, after which the trays are conveyed to packing tables where the biscuits are removed by packers who prepare cartons from blanks and fill the cartons. The filled cartons are then placed on a conveyor which carries them through devices for closing and sealing the cartons and delivers them at a convenient point in condition for shipment. Owing to the numerous manual operators, such as packers, bakers, etc., required to carry out this method of manufacture, the labor charge is an important element in the final cost and the necessary distribution of the different machines and ovens requires a great deal of floor space. Also, the rate of production is relatively low and can only be increased by duplication of mechanism and of the number of operators.

The object of the present invention is to provide a machine in which the several operations involved in the production of the biscuits and the formation, filling, and sealing of the cartons may be carried on by mechanism which operates automatically and continuously, the various steps in the manufacture being carried out in proper

sequence so that the product passes from one mechanism to another successively, eventually being led to a carton-filling mechanism where the biscuits are packed into cartons of the desired capacity and the cartons are closed and sealed ready for distribution.

The new machine includes a baking oven of substantial size, a conveyor which moves into, through, and out of the baking oven and if desired a drying chamber, automatic mechanism for shredding the wheat, making the biscuits from the shreds and depositing the uncooked biscuits upon the conveyor at a suitable point, and automatic mechanism cooperating with the conveyor at a point outside the oven for removing the cooked biscuits from the conveyor and placing them in selected quantities in cartons. The conveyor employed is preferably arranged for continuous slow movement as a whole and periodic arresting of the movement of a portion or portions thereof which cooperate with the automatic mechanism for supplying the uncooked biscuits to the conveyor and removing the cooked ones therefrom.

The operations of making the biscuits and supplying them to the conveyor are preferably accomplished by a mechanism similar to those heretofore employed and this mechanism is arranged transverse to the travel of the conveyor so that a plurality of uncooked biscuits are delivered at regular intervals to the conveyor in a row extending across the latter. This mechanism receives the prepared wheat, shreds it, deposits the shreds upon a traveling link-belt, cuts the strand of shreds to form the biscuits, then supports the biscuits from above while carrying them out over the conveyor and then drops a plurality of the biscuits simultaneously to deposit them on the conveyor in a row extending crosswise thereof. This mechanism is actuated in synchronism with the movement of the conveyor so that the dropping of a row of biscuits takes place when the portion of the conveyor which receives the biscuits is, in effect, at rest.

The automatic mechanism for removing the cooked biscuits from the conveyor includes a reciprocating member which engages a group of biscuits on the conveyor

and moves these biscuits in a row off the conveyor and upon a suitable receiver. A series of individual engaging elements, one for each biscuit in a row, is mounted upon this reciprocating member so that each biscuit is moved free of contact with every other biscuit of the row. This is of importance both to prevent injury to the fragile biscuits, and also to keep accurate control of the positions of all the biscuits and thus make automatic packaging possible. The operation of this reciprocating member or rake is timed accurately with reference to the movement of the conveyor so that the removal of a row of biscuits takes place when the portion of the conveyor with which the rake cooperates, is, in effect, at rest.

This automatic delivery mechanism moves the biscuits of a row or group from the conveyor to a carton-filling station, each biscuit being moved in a straight line transverse to the direction of movement of the conveyor. Preferably the movement is in several steps, the biscuits being first moved off the conveyor and upon and inspection platform, along which they are moved in successive steps to a position from which they are delivered to the carton-filling devices. The cartons are moved to the carton-filling position automatically, being fed successively from a stack of cartons in collapsed condition and in the course of their movement opened and acted upon by folding devices which turn the flaps of the cartons appropriately. At the filling station, groups of biscuits are introduced into the cartons to form successive layers therein, the cartons containing, for example, twelve biscuits in four layers of three biscuits each. Strips of paper are placed in the cartons between successive layers by appropriate mechanism during the filling operation. Since the biscuits are of a delicate structure, they cannot be allowed to drop into position in the cartons. Consequently, at the filling station a platform is provided which is projected up through the carton to be filled. A layer of biscuits is then moved upon the platform and the platform lowered a step. A strip of paper is now placed over the layer of biscuits; then another layer of biscuits is put in position and the platform lowered a second step, these operations being repeated until the carton is filled. It is then ejected from the packing devices, acted upon by a folding mechanism which turns the flaps to close the carton, and then the carton is sealed by suitable sealing devices.

For a better understanding of the invention, reference will be made to the accompanying drawings, in which there is illustrated an embodiment of the invention suit-

able for the manufacture of shredded wheat biscuits. In these drawings,

Fig. 1 is a plan view of the complete apparatus with certain parts broken away or removed,

Fig. 2 is a view in side elevation of the shredding devices, the strand conveyor, and the biscuit forming devices,

Fig. 3 is a transverse section through the biscuit depositing mechanism taken from line 3-3 of Fig. 1,

Fig. 4 is a side view of the apparatus, with certain parts broken away and removed,

Fig. 5 is a view in elevation of a portion of the baking conveyor, showing the manner in which the pans of the conveyor are maintained upright at all times,

Fig. 6 is a view in side elevation of the biscuit removal device and the mechanism for introducing the biscuits into the cartons,

Fig. 7 is a plan view of the parts of the machine shown in Fig. 6,

Fig. 8 is a horizontal sectional view on the line 8-8 of Fig. 6, showing in plan certain parts for operating the carton-feeding devices,

Fig. 9 is a similar view showing the main drive shaft and the mechanism by which the cartons and biscuits are fed, this figure being taken on the line 9-9 of Fig. 6,

Fig. 10 is a plan view in detail on an enlarged scale showing the mechanism for feeding the cartons from the stack and opening and advancing the cartons toward the packing station, parts of the mechanism being shown in horizontal section,

Fig. 11 is a perspective view of the parts shown in Fig. 10,

Fig. 12 is a perspective view of portions of the carton feeding mechanism, the biscuit feeding mechanism, and the devices for feeding the paper,

Fig. 13 is an enlarged perspective view of parts by which the flaps of the cartons are folded to proper position in the movement of the cartons to the packing station,

Fig. 14 is a perspective view similar to Fig. 7, but showing certain parts removed and other parts in operative position,

Fig. 15 is a vertical sectional view showing parts for feeding the biscuits taken on the line 15-15 of Fig. 9,

Fig. 16 is a front elevation of certain of the parts shown in Fig. 15, taken on the line 16-16 of Fig. 9,

Fig. 17 is a vertical sectional view of the end of the main cam drum, taken on the line 17-17 of Fig. 9,

Fig. 18 is a vertical sectional view through the bed plate of the cam frame, taken on the line 18-18 of Fig. 8,

Fig. 19 is a detail sectional view taken along the line 19-19 of Fig. 8,

Fig. 20 is a detail sectional view of a

carton feeding device, taken along the line 20—20 of Fig. 8,

Fig. 21 is a detail vertical sectional view of the carton opening device, taken along the line 21—21 of Fig. 8,

Fig. 22 is a detail vertical sectional view of a carton feeding device taken on the line 22—22 of Fig. 8,

Fig. 23 is a vertical sectional view, taken on the line 23—23 of Fig. 22,

Fig. 24 is an elevational view of a certain drive mechanism, parts being shown in section and the view being taken on the line 24—24 of Fig. 9,

Fig. 25 is a view in elevation of certain drive mechanism, parts being shown in section, the view being taken on the line 25—25 of Fig. 9,

Fig. 26 is a vertical sectional view taken on the line 26—26 of Fig. 25,

Fig. 27 is a view in front elevation and partly in section of the carton filling devices, taken on the line 27—27 of Fig. 7 and showing the parts in lowered position;

Fig. 28 is a horizontal detail view taken on the line 28—28 of Fig. 29,

Fig. 29 is a vertical sectional view taken on the line 29—29 of Fig. 28,

Fig. 30 is a view similar to Fig. 29 showing the parts in a different position,

Fig. 31 is a vertical sectional view, partly in elevation, of the carton filling mechanism, showing the parts in raised position.

Fig. 32 is a similar view with parts broken away showing the parts partially lowered,

Fig. 33 is a vertical sectional view, partly in elevation, of one end of the carton filling devices, showing the packing frame about to be raised,

Fig. 34 is a horizontal sectional view taken on the line 34—34 of Fig. 27,

Fig. 35 is a vertical sectional view taken on the line 35—35 of Fig. 27,

Fig. 36 is a horizontal sectional view taken on the line 36—36 of Fig. 27,

Fig. 37 is a side view of the carton feeding and filling mechanism taken on the line 37—37 of Fig. 7,

Fig. 38 is a horizontal sectional view on the line 38—38 of Fig. 27,

Fig. 39 is a similar view, showing the parts in different position,

Fig. 40 is a vertical sectional view taken on the line 40—40 of Fig. 38,

Fig. 41 is a detail sectional view taken on the line 41—41 of Fig. 38,

Fig. 42 is a vertical sectional view of the carton spacing mechanism, taken on the line 42—42 of Fig. 37,

Fig. 43 is a front elevational view of the biscuit removal mechanism, taken on the line 43—43 of Fig. 7,

Fig. 44 is a similar view with parts broken away,

Fig. 45 is a vertical sectional view taken on the line 45—45 of Fig. 43,

Fig. 46 is a detail sectional view on the line 46—46 of Fig. 45,

Fig. 47 is a detail sectional view on the line 47—47 of Fig. 45,

Fig. 48 is a perspective view of mechanism for conveying the filled cartons and for folding the flaps thereof,

Fig. 49 is a view, partly in elevation and partly in section, taken on the line 49—49 of Fig. 50,

Fig. 50 is a transverse vertical sectional view on the line 50—50 of Fig. 49, and

Fig. 51 is a detail view showing one of the collapsed cartons folded in the manner in which it is supplied to the machine.

In the drawings, and with reference particularly to Fig. 1, the apparatus is shown as including an oven 60 of considerable length and a conveyor 61 which moves into, through, and out of this oven. The conveyor is provided with transverse pans and at one point in its travel, preferably outside the oven, the conveyor receives unbaked biscuits deposited in rows in the pans by a feeding mechanism, generally designated 62. The conveyor carries the biscuits through the oven and after being baked and dried the biscuits are removed from the pans by a delivery device, generally designated 63. This device has the form of a reciprocating rake and it removes the biscuits from the pans in rows and deposits them upon an inspection platform. The biscuits are moved across this platform in successive steps, and are eventually delivered in two groups of three to a packing station to which cartons are fed from a supply 64 by suitable devices which open the cartons, fold the flaps appropriately, and move the cartons into position to be filled. After the biscuits have been placed in the cartons to the capacity of the latter, the cartons are moved rearwardly along guide-ways 65 to a conveyor 66 which advances the cartons through sealing mechanism 67. After being sealed, the cartons are discharged.

The biscuits are made from cereal grain given a preliminary cooking treatment and then delivered to the hoppers of shredding devices 68 (Fig. 2) which include a pair of rolls which act on the grain and transform it into a plurality of continuous filaments which are deposited upon an endless link belt 69. Several of these shredding devices are employed so that the strand may have the desired thickness. The belt 69 is made up of links 70 and rollers 71 and the upper horizontal stretch on which the strand is deposited runs on tracks 72. Above this stretch of the belt is an upper cutter chain 73 made up of links 75 connected by rollers 76, and the upper stretch of the chain trav-

els over a track 77 and the lower stretch beneath a track 78. The links 75 carry cutter blades 79 and are hollow, as shown at 80 (Fig. 3) their lower faces being covered by wire screens 81. The upper cutter chain is guided so that its lower stretch lies close to the upper horizontal stretch of the conveyor belt and the chain extends a considerable distance beyond the end of the belt. The lower cutter chain made up of links 82 connected by rollers 83, which carry cutter blades 84, lies within the loop of the conveyor belt and its upper stretch is guided over a track 84' in close proximity to the under surface of the belt. The links of the conveyor belt are separated in such manner that the cutter blades 79 and 84 of the two chains pass between the spaces between the links of the conveyor chain and cooperate to divide the strand of filaments carried by the conveyor into a plurality of individual biscuits.

The portion of the upper chain which extends beyond the end of the loop of the conveyor chain serves as a part of the feeding mechanism and disposed within the loop of the upper chain and extending beyond the end of the conveyor chain loop, is a vacuum chamber 85 with which may be associated a compressed air chamber 86. Both chambers have similar lengthwise slots 87 and 88 in their lower walls. Mounted on suitable flanges on the lower walls of the chambers is a slide 89 which carries a series of valve plates 90 arranged lengthwise of the chambers for controlling the flow of air through the slots. These valve plates move in seats in the slide and have openings 91, 92 separated by a solid part 93. By moving the valve plates horizontally, the openings in the plates will open one chamber and close the other. Each plate is actuated by a rocker arm 94 pivoted on a slide 95 extending along the side wall of the chamber 85, and this rocker arm is rocked by a cam 96 on the shaft 97 mounted in brackets on the slide 95. At the side opposite that engaged by the rocker arm, each plate carries a rod 98 encircled by a spring 99 bearing at one end against a part of the plate and at the other against an extension of the slide 89.

It will be seen that the links in the lower horizontal stretch of the upper cutter chain lie close to the lower walls of the chambers, and in the operation of the mechanism the strand carried by the conveyor is first subdivided by the action of the cutter chains into individual biscuits, and as the biscuits pass along on the conveyor chain in contact with the hollow links of the upper cutter chain, at the appropriate instant the valve plates 90 are moved successively by the rocker arms to a position in which the hollow links are placed in communication with the interior of the vacuum chamber 85. The

vacuum lifts the biscuits from the conveyor chain and holds them against the lower faces of the hollow links, and as these links pass along beyond the end of the loop of the conveyor chain, a row of biscuits is thus removed therefrom. The chambers 85 and 86 extend out over the baking conveyor 61 and when a group of biscuits held by suction against the faces of the hollow links is sufficient in number to fill a pan, the valve plates 90 are operated simultaneously throughout the length of the chambers to close the vacuum chamber from the links and to put the pressure chamber in communication with the links. This causes the biscuits to be dropped from the links upon one of the pans 100 of the baking conveyor.

The portion of the baking conveyor passing beneath the depositing mechanism moves with a step by step movement, each step of the movement resulting in a pan being placed in position to receive biscuits. When this pan is filled, another pan is brought into position and during this period the upper cutter chain continues to move; the valve plates are again moved one after another to place the links in communication with the suction chamber, and another row of biscuits is removed from the strand conveyor, brought out over the next pan, and deposited therein.

While it is possible to discharge a group of biscuits upon a pan while the pan is moving continuously beneath the feeding mechanism, the depositing taking but an instant, it is preferable to give the pans the step by step movement and to charge each pan in one of the periods of rest of this movement. For this purpose the conveyor construction illustrated in Figs. 4 and 5 is employed. The conveyor is endless and has a portion which lies within the oven chamber, entering the latter near the top of the front wall and leaving through the front wall near the bottom. The conveyor chain is formed of a pair of side chains made up of links 101 connected loosely by transverse rods 102 which carry lugs 103 to which are secured the pans 100. From the ends of the rods 102 depend lugs 104 connected by links 105. These links form a supplementary chain and by moving this chain with reference to the main chain in an appropriate manner, the pans may be maintained upright, regardless of the position of the links 101 with reference to the pans.

The conveyor entering the oven near the top of the latter is led through the oven in a plurality of horizontal stretches, indicated at 106. The top stretch of the conveyor passes to a point near the far end of the oven and is led around a sprocket wheel 107. The conveyor is then led forwardly, passing around another sprocket wheel 108 near the front end of the oven, and a plu-

ality of open loops are thus formed in the conveyor so that the biscuits on the pans traverse the oven a number of times during the baking operation. Within the oven are heating units, generally designated 109 and here illustrated conventionally as electrical heating elements. Other heating means for the oven, however, may be employed. These heating devices are arranged so that the unbaked biscuits entering the oven are exposed to a relatively high temperature and then passing downwardly through the oven, are exposed to decreasing temperatures, so that after the preliminary baking the biscuits are dried.

In view of the great length of the conveyor, it is not desirable to move it as a whole with a step by step movement, but those parts of the conveyor that are to receive the biscuits and from which biscuits are to be removed, I prefer to move intermittently in order to facilitate these operations. For this purpose the portion of the conveyor outside the oven is guided through a depending loop consisting of two vertical stretches connected by a horizontal stretch. This horizontal stretch is moved to and fro in a direction lengthwise of the conveyor, and although the conveyor as a whole is moving continuously, the pans in the horizontal stretch of the loop are moved with a step by step movement. These pans pass beneath the biscuit depositing device and successive pans receive biscuits at each period of rest of the movement. The removal mechanism presently to be described also operates to remove biscuits from the pans while the latter are at rest and it is preferable to lead the conveyor through two loops, one associated with the biscuit depositing device, and the other with the biscuit removal mechanism. This permits the deposition and removal of biscuits from portions of the conveyor moving step by step and affords sufficient room for the two groups of mechanism.

The conveyor chain passing out from the bottom of the oven, is led around sprocket wheels 110, one for each of the side chains of the conveyor, the sprocket wheels being mounted on a shaft 111 in suitable bearings. From the sprocket wheels 110, the conveyor passes upwardly over sprocket wheels 112 mounted on a shaft 113. This shaft is journaled in bearing blocks 114 slidable in suitable guide-ways, provided in the framing and moved to maintain the conveyor chain taut by means of springs 115. From the sprocket wheels 112, the conveyor passes down in a vertical stretch 116, then around sprocket wheels 117, mounted in rods 118 pivotally suspended from a bar 119 of the frame. From the sprocket wheels 117, the conveyor passes in a horizontal stretch 120, suitably supported on tracks 121, to sprocket wheels

122 mounted on a shaft carried in the lower ends of similar arms 118. The two sets of arms 118 are connected by a cross member 123. From the sprocket wheels 122, the conveyor extends upwardly to sprocket wheels 124 supported on shafts mounted on the framing, then across to similar sprocket wheels 125 and then downwardly around sprocket wheels 126 supported on a shaft in the lower ends of arms 118. From sprocket wheels 126, the conveyor passes in a horizontal stretch 127 running on a track 128 to sprocket wheels 129 mounted on the shaft on the ends of another pair of arms 118. The conveyor then passes upwardly and around sprocket wheels 130 supported on a shaft journaled in bearings in the framing and from the sprocket wheels 130 the conveyor passes in a horizontal stretch 131 into the oven through an opening in the front wall.

The conveyor led around the sprocket wheels in the manner described, forms two depending loops having horizontal stretches 120 and 127. The arms 118 in each loop are connected by rods 123 and the arms of the two loops are connected by a connection rod 132. Connected to the bearing of the shaft of sprocket wheels 126, is a rod 133 having an adjustable connection with a rock arm 134 pivotally mounted on the bed of the machine at 135. This arm 134 is reciprocated by means of cams 136 mounted on a driven shaft 137.

The conveyor as a whole is driven by means of the sprocket wheels 108 at one end of the oven, which are driven by suitable gearing connections from vertical shafts 138 driven by gearing from a main drive shaft 139, which is in turn driven from any suitable source of power. A horizontal shaft 140 is driven through gearing connections from the vertical shaft 138 and through gearing connections drives the shaft on which sprocket wheels 130 are mounted. A second horizontal shaft 141 is driven through a suitable connection from shaft 140, and this shaft drives the shaft of sprocket wheels 125 and also drives the vertical shaft 142 which drives the shaft 111. A horizontal shaft 143, driven through gearing from the shaft 138, drives a transverse shaft 144 which drives the shaft 137 through suitable connections (not shown). The sprocket wheels 112 and 124, and the sprocket wheels carried in the ends of the depending arms 118, are idlers. The spring take-up for the shaft 113 keeps the conveyor chain taut outside the oven, and similar spring take-ups are employed in connection with the shafts of the sprocket wheels 107.

The conveyor as a whole has a continuous movement, but the portions forming the horizontal stretches of the two loops are reciprocated on their tracks by means of the

cams 126 and the rocker levers 134. In each movement of the rock levers in a direction opposite to that in which the conveyor is moving, one link of the conveyor chain in each vertical stretch 116 of the loops is placed by the sprocket wheels 117 and 126 on the tracks 121 and 128, and sprocket wheels 122 and 129 release a link carrying a pan from this horizontal stretch and permit the link to move upwardly. The remaining links of the horizontal stretches remain at rest. When the rock levers 134 reciprocate in the direction in which conveyor chain is moving, the horizontal stretches are advanced by one link. Accordingly, the pans are brought successively to rest in one loop beneath the depositing mechanism 62 and in the other loop beneath the biscuit removal mechanism 63. At each period of rest of the pans, a group of biscuits is deposited in a pan by the depositing mechanism and a group of biscuits is removed from a pan by the biscuit removal mechanism.

In order that the pans may be maintained upright at all times throughout the movement of the conveyor chain, suitable guiding devices are provided for the supplementary chain. One of such devices is illustrated in Fig. 5, where the conveyor chain is shown passing about a sprocket wheel such as 107. On the journal box of the shaft 146 of the sprocket wheels 107 is mounted an eccentric disc 148 and a ring 149 is mounted for rotation on this disc. This ring is provided with seats 150 in its rim and each seat receives the end of a lug 104 as the conveyor chain passes around the sprocket wheels 107. The eccentricity of the disc 148 is such that the lugs 104 are given a movement relative to the links 101 sufficient to maintain the pans in vertical position, even though the links 101 are inverted after their movement around the sprocket wheels 107. Similar guiding devices are employed at each point where the conveyor chain changes direction.

The oven enclosure through which the conveyor chain is led is formed of side walls of suitable installing material and is provided with a partition 150 dividing the enclosure into an upper shallow baking chamber and a lower deeper drying chamber. Passing out of the oven near the bottom of the front wall through a suitable opening, the conveyor travels through a conduit indicated generally at 151 and provided with a gate 152 at its rear end, by which the ingress of air may be controlled. Additional air may be introduced into the oven through the opening near the top of the front wall through which the conveyor chain enters the oven, and at the rear end of the oven is an air outlet 153 connected to suitable air suction means by which air may be drawn

through the openings mentioned and passed completely through the oven from one end to the other. A branch line 154 leads to openings in the top of the oven (not shown) and provides means for removing the moisture-laden air from the oven chamber.

The delivery mechanism (Figs. 6, 7, 43 to 47, inclusive) by which the baked dried biscuits are removed from the conveyor, is disposed opposite the first conveyor loop at the right in Fig. 4, and operates in timed relation to the intermittent movement of the pans in the horizontal stretch of the loop, the biscuits thus being removed from the pans while the latter are temporarily at rest. This device is mounted on the bed plate 155 supported on suitable standards 156, 157. Beneath the bed plate near one end is journaled a main drive shaft 158 driven from any convenient source of power and preferably connected with the drive shaft 139, the shaft 158 carrying a fly wheel 159. The shaft 158 drives the biscuit removal mechanism directly and drives the carton feeding and filling devices through gearing, and the drive is so arranged that by operating a clutch 160 only the biscuit feeding mechanism will continue in operation, the other devices being disconnected from the shaft. This clutch mechanism includes the clutch 160 actuated by a lever 161 pivoted at 162 on the bed plate and controlled from the front of the machine by a rod 163 sliding in a bearing 164. At its forward end the rod has a handle by which it may be manipulated by the attendant.

The delivery mechanism includes upright supports 165 and 166 secured to the bed plate 155 and carrying spaced parallel bars 167 and 168 which are of square cross-section and turned edgewise to resist bearing strain. Upon these bars is slidably mounted the frame consisting of uprights 169 and 170 having passages therein engaging the bars 167 and 168 and connected at their upper ends by a cross piece 171 having an arched handle portion 172. These uprights are connected at their lower ends by a cross piece 173.

Upon the front faces of the uprights 169, 170 are stud bolts 174, 175 upon which are mounted vertical slotted extensions 176, 177 of an elongated plate 178 which is adapted to have a longitudinal movement in unison with the frame and a vertical movement relatively thereto. Within the frame and slidably mounted upon the bars 167, 168, is a slide piece 179 preferably formed of two pieces bolted together and provided at each side of its lower end with adjustably mounted bolts 180, 181, arranged to engage stop lugs 182, 183, upon the cross piece 173 as the slide piece is moved to the right or left. Upon the upright parts of the frame 169, 170 are pivotally mounted bell crank

levers 184, 185, the lever 185 being inverted with reference to the lever 184. The arms of the levers are connected to the slide block 179 by links 186, 187, while the long arms are connected by links 188, 189 to the plate 178. As the slide block is moved to the right relative to the slide frame, the bell cranks are moved to lower the plate 178, and when the slide block is moved to the left with reference to the slide frame, the bell cranks are caused to raise the plate 178.

A long stroke lever 190 (Fig. 6) is pivotally mounted to the base at 191 and is connected at its upper end to the slide block 179 by a link 192. This lever is jointed at 193 for adjustment and is connected with the upper end of a lever 194 pivoted to the standard 156 at 195. The lever 194 has a slot 196 engaged with a slide block 197 mounted eccentrically upon a disc 198 which is mounted on the main drive shaft 158. The oscillation of the disc imparts a compounded long swing to the lever 190 and in operation the initial swing to the right slides the block 179, lowering the plate 178 through the rotation of the bell crank levers 184 and 185 until the bolt screw 181 strikes the stop lug 183, the slide block and the frame then moving in unison. On the reverse movement, the block 179 first moves to the left, causing the plate 178 to be lifted, this raising movement continuing until the bolt screw 180 engages the lug 182, whereupon the frame and slide block are moved in unison toward the left.

On the plate 178 is a series of blades which are adapted to engage behind the biscuits and feed them forwardly. The horizontal stretch of the conveyor in the first loop passes beneath the end of the plate 178 and mounted on the bed plate of the machine is an inspection table 199 supported on uprights 200. This inspection table extends close to the ends of pans 100 and in each period of rest in the intermittent movement of the conveyor, one of the pans lies with its end in registry with the platform 199. During such movement the plate 178 has moved out to a position over the pan and at the proper instant the plate is lowered so as to bring the blades close to the surface of the pan, the blades entering the spaces between adjacent biscuits on the pan. The plate 178 now moves in unison with the slide block so that the blades carry the biscuits from the pan to the inspection platform and at each reciprocation of the plate 178, six biscuits are moved from the pan to the platform and twelve biscuits previously deposited on the platform are moved by the blades in successive steps to a position whence they are to be transferred to the packing mechanism. As each pan contains twelve biscuits in a row and the removal device only removes six biscuits, a second re-

moval device removing biscuits from the opposite side of the pan is intended to be used in this machine. This biscuit removal mechanism, and the packing devices associated with it, are the same as those illustrated, but they are merely reversed in operation.

Each of the blades 201 by which the individual biscuits are engaged, each biscuit thus being removed under exact control from the pan and similarly advanced along the platform, is flexibly mounted on a pair of pivotal frames 202, 203 which are supported on shafts 204, 205, mounted in brackets 206 secured to the outer side of the plate 178. The side portions of the frames 202 and 203 are slotted so that the shafts 204 and 205 are slidably mounted therein, coil springs 207, 208 being disposed between the shafts and the cross pieces 209 and 210 of the frames so that pressure in either direction on the blades will move either the upper or lower frame relatively to the shafts compressing the springs. Upon release of the pressure, the blades assume their normal positions. A stop pin 211 engaging the under side of the frame 202, limits the downward movement of the blades, the frame being yieldably held against the pin by a spring 212 which is coiled about the shaft and tensioned through the engagement of its end 213 with the bracket 203. The construction is such that the blade is capable of yielding upwardly, forwardly, and rearwardly so that if a biscuit is in the path of the blade when the blade is moved down, the blades will yield so as not to damage the biscuit.

As the biscuits are moved along the platform 199 in successive steps, they are eventually deposited in front of a feed bar 214. The packing mechanism is arranged to fill two cartons simultaneously, and the biscuits are fed to the cartons in groups of three. The six biscuits deposited in front of the feed bar by the action of the biscuit removal device are equally spaced and as the feed bar reciprocates at right angles to the direction in which the biscuits have been led to it, delivering the biscuits to the packing devices, the biscuits are divided into groups of three by a V-shaped deflector 215.

The cartons are supplied from a hopper which comprises an inclined base 216 (Figs. 10 and 11) supported between side plates 217 and 218 secured at their flanged bases 219 and 220 to the bed plate. The cartons are stacked vertically in flattened condition in the hopper, and these cartons have side and end flaps at top and bottom which are turned outwardly so as to lie against the vertical walls of the cartons. A slide follower 221 is mounted in the hopper to force the stack of cartons into the lower end thereof, this hopper having a guide rod 222 which

is mounted in the sides 223 and 224 of the hopper and projects through slots 225, 226 in the side plates. To the ends of the rod are connected cords 227, 228, which extend over guide rolls 229, 230, 231, 232 and carry weights 233 and 234, at their lower ends. These weights force the follower against the stack of cartons.

The front end of the hopper is normally closed by a sliding feed member 235 and extending from the hopper at one side along the feed plate is a guide-way having a hollow wall 236 at one side. Its inner surface is substantially flush with the lower end of the hopper and the other wall 237 of the guide-way is also hollow and is spaced from the wall 236 a distance equal to the width of an opened carton. This longitudinally extending guide-way communicates at its end with a guide-way extending forwardly therefrom and at right angles, this guide-way having a width corresponding to the length of an opened carton and being bounded by hollow walls 238, 239. This guide-way in turn communicates with a third guide-way extending at right angles thereto and parallel to the first guide-way, being bounded by hollow walls 240, 241.

These several hollow walls are suitably secured together by air-tight connections and the spaces between the contacting walls are in communication. The inner surfaces of the walls are perforated as indicated at 242 and a partial vacuum is maintained within the walls by means of a suction chamber 243 connected to an air exhaust by a pipe 244 and to flanged outlets 245, 246 of the walls 236 and 237 by pipes 247 and 248. The suction walls exert a grip on the side walls of the cartons, tending to maintain them in opened condition. The guide-ways are arranged in the manner described so that the cartons may be conveniently fed one by one from a hopper, opened and delivered in single file with their ends in contact to a position in front of the packing devices where the two end cartons are moved abreast to the packing station. In the movement of the cartons from the hopper to the packing station, the bottom end flaps of the cartons must be turned inwardly and this is conveniently done by feeding the cartons at one point along a guide-way through which the cartons move with their sides uppermost, folding devices acting on the bottom end flaps in this movement and turning them inwardly.

The reciprocating feed member 235 moves to and fro in front of the hopper and at its forward end carries a pusher head 249 which is guided in its movement by means of an angle flange 250 projecting at one side and engaging a slotted guide block 251 fixed to the bed plate. The inner face of the slide member is provided with a recess 252 having a shoulder 253 at the end of the re-

cess. As the slide member moves across the end of the hopper, the shoulder picks up a flattened carton and moves it forwardly into engagement with the inner surface of the wall 236, and as the slide member retracts, the flattened carton remains in contact with the surface of the wall, being held there by the suction. The part 254 of the wall adjacent the hopper is solid and unperforated, this part having a length corresponding substantially to the width of the end of a carton. The carton fed by the slide feed member and deposited against the inner surface of the wall 236, is gripped along its side by the suction action, while its end opposite the unperforated part of the wall is free.

The slide feed member 235 is reciprocated by means of a lever 255 pivotally mounted at 256 on an extension 257 of the base of standard 157, the lever extending upwardly through a slot 258 in the bed plate and being connected to a forked link 259 adjustably secured in a slot 260 in the lever. A connecting rod 261 extends from the lever 255 to a lever 262 pivotally mounted at its lower end 263 upon standard 158 and provided on its upper end with an enlarged head having parallel slots 264, 265, the slot 264 being relatively wide and having its axis coincident with the axis of rotation of the lever, while the narrower slot 265 is offset and is pivotally connected to the end of the rod 261 by an adjustable connection 266. The slot 264 receives an eccentric crank pin 267 slidable therein, this pin being mounted on a disc 268 secured to the end of an auxiliary drive shaft 269 journaled in the frame and driven by the main shaft 158 by gears 270 and 271 (Fig. 9) and an intermediate gear 272 mounted on a stud shaft 273. The gear ratio is such that the shaft 269 is rotated once for each two rotations of the shaft 158. Thus, for each four rotations of the main drive shaft, two cartons are fed from the hopper. The gear 270 is loose upon the shaft 158 and is connected thereto through the operation of the clutch 160 so that upon occasion the shaft 158 may rotate without driving the gear 270.

At the end of the wall 237 and substantially diagonal with reference to the solid portion 254 of the wall 236, there is disposed a swinging suction head 274 (Figs. 8, 10, 11, 21) which is hollow and has perforations 275 in its front face. Its rear face has a flanged outlet 276 connected by flexible pipe 277 to the suction chamber 243. Near its base the head has projecting arms 278, 279 which are pivotally connected to the ends of the crank arms 280, 281 mounted on the upper ends of shafts 282, 283 journaled in the bed plate and carrying crank arms 284, 285 on the lower ends beneath the bed plate. A third crank arm 286 is mounted upon a

stud shaft 287 below the bed plate and the ends of the three arms 284, 285, and 286 are connected by a bar 288 so that they will operate in unison.

The bar 288 is swung to and fro transversely of the bed plate to oscillate the crank arms by means of a lever arm 289 to which it is connected by a link 290, adjustably and pivotally connected at one end 291 in a slot 292 in the end of the lever 289 and pivotally connected at its other end to the bar 288. The lever 289 is pivotally connected at 293 to the under side of the bed plate and is provided intermediate its ends with a roller 294 sliding in a cam groove 295 of a cam plate 296 mounted on the reciprocating cam supporting frame comprising rails 297 and 298 (Figs. 8, 18) connected at their rear ends to a dove-tailed slide bar 299 which is slidably mounted in beveled guides 300 and 301. The forward ends of the rails are connected by a plate 302 which has a forwardly extending arm 303 slidably mounted in dove-tailed guides 304 and 305 secured to the under side of the bed plate. An intermediate cross piece 306 also connects the two side rails, a lug 307 formed on its under surface being connected by a link 308 to the lever 295 so that the lever in its oscillation reciprocates the cam frame.

The cam groove 295 of the plate 296 is so arranged that as the lever 255 and the cam frame are moved in a direction to withdraw the slide feed member 235, the lever 289 is swung forwardly from the position shown in Fig. 3. In such movement the head 274 is swung to the full line position shown in Fig. 7 and it contacts with the inner wall of a carton which has been fed by the sliding head. As the cam frame moves in the opposite direction, the head is swung back to its original position and swings the carton open. As the slide feed member 235 again moves forwardly, feeding a flattened carton, its head 249 engages the opened carton and pushes it forward in the guide-way, together with the carton previously opened.

At the corner formed by the meeting ends of the side walls 237 and 239 there is an opening 309 (Figs. 11, 22) bridged over by the reduced ends 310 and 311 of the side walls. Within this opening is a pusher head 312 which is adapted to receive cartons pushed forwardly by the head 235 and to advance these cartons along the guide-way between the walls 238 and 239. The head 312 is mounted at one end upon a bracket 313 which is mounted on the slide rod 314 and the head is connected at its rear face by a link 315 to a post 316 mounted on a slide rod 317 disposed beneath the rod 314 and arranged for movement relative thereto. The bracket 313 and the post 316 extend upwardly through a slot 318 in the bed plate (Fig. 22) and the slide rods are moved in a

channeled guide 319 secured to the under side of the bed plate and provided with retaining strips 320, 321, projecting over the channel to hold the rods therein. The rod 314 has a slot 322 formed in it into which enters a pin 323 mounted on the rod 317. The pin 323 is arranged so that when rod 317 is moved in either direction, it first moves relatively to rod 314, then the two move in unison.

The forward movement of the slide member 235 advances a carton beyond the corner formed by the walls 236 and 238 and as the carton advances, the head 312 is being withdrawn and rod 317 first moves relatively to the rod 314 so as to swing the head 312 out of the path of the advancing cartons. On the continued rearward movement of the rod 317, the two rods 314 and 317 move together until the outer swinging end of the head 312 engages the wall 237, whereupon the further movement of the rod 317 causes a slight forward movement of the pin in the slot, resulting in the head 312 being straightened and aligned with the inner surface of the wall 237.

The rear end of the rod 317 is connected to a link 324 (Fig. 8) adjustably and pivotally connected at its end to the slotted end 325 of a lever 326 pivotally mounted at its opposite end 327 on a convenient part of the machine frame. The lever 326 carries a cam roller 328 lying within a cam groove 329 in a cam plate 330 carried on the reciprocating cam frame. This cam groove forms a closed path for the roller and within the cam groove are leaf springs 331 and 332, one end of each of which is embedded flush with the surface of the groove (Fig. 19) while the free ends of the leaf springs are forced upwardly by coil springs 333 in sockets 334. In the reciprocation of the cam frame, the ends of the leaf springs projecting into the cam groove prevent the return movement of the roller along the same path, and insure that the roller will travel in such a way as to swing the lever 326 to advance and retract the rod 317 and with it the head 312.

As the cartons are fed between the walls 238 and 239, their bottom end flaps are turned inwardly partially to close the bottoms of the cartons, by means of flap-folding devices disposed at each side of the guide-way. These devices comprise shoes 335, 336 (Figs. 12, 13) which are mounted above openings 337 and 338 in the bed plate and have bracket lugs 339 secured to the bed plate by screws 340. The shoes extend upwardly into elongated openings 341 and 342 formed in the walls 238 and 239 respectively, the opening 341 being relatively higher and extending forwardly to the end of the wall 240 to accommodate a carton feeding head presently to be described. The front end of each shoe is provided with a

beveled nose portion 343 and at the under side each shoe has a depending turning flap 344 which terminates at one end rearwardly of the nose of the shoe, its beveled edge 345 being substantially a continuation thereof. The flange is bent inwardly beneath the plate 346 which extends over an opening 347 of the bed plate. The plate 346 is flush with the surface of the bed plate and is held in position by screws 348 and 349 which enter a projecting portion 350 of the bed plate, the plate 346 extending rearwardly of the end of the shoe and having its end spaced from the beveled end 351 of the opening 347 to form an outlet slot for the turned end flap. As the cartons move forwardly, the nose portions 343 of the shoes enter between the up-turned end flaps, turn them outwardly along the edges 345 of the flanges to the folded-in position between flanges 344 and plates 347, the inwardly turned flaps then moving out through the slots to the ends of the plates 346.

The cartons advanced to the ends of the guideway defined by walls 238 and 239, are now fed at right angles thereto between walls 240 and 241. The mechanism by which the cartons are advanced in the new direction includes spaced lugs 352, 353, 354 (Fig. 14) on a flange 355 at the forward end of the arm 303 of plate 302. In these lugs are journaled the shafts 356, 357, and 358 to which are secured crank arms 359, 360 and 361, connected at their outer ends by a bar 362. To the upper ends of the shafts 357 and 358 are secured lever arms 363, 364 on which there is pivotally mounted a pusher head 365 disposed in the opening 341 of the wall 238 and adapted to move through a communicating opening 366 (Fig. 12) provided in the wall 240. A link 367 is pivotally connected to one end of the bar 362 and at its other end is connected pivotally to the slotted end of a lever arm 368 pivotally mounted at 369 on the plate 302. A roller 370 carried on an extension of the arm enters an opening 371 in the plate 302 and cooperates with a cam projection 372 provided on a stationary plate secured beneath the bed plate of the machine.

The cam projection 372 cooperates with the wall of the opening to form a closed path of travel for the roller 370 and a leaf spring 373 secured at one end and having its other end forced upwardly by a coil spring 374 disposed beneath it, lies in the path of travel of the roller, so that as the cam slide reciprocates, the roller is forced to pass around opposite sides of the cam projection in its forward and return movement. On the shaft 357 is a coil spring 375 which tends to force the crank arms in a clockwise direction and through the linkage the lever 368 is yieldingly forced to one side so that the roller in one movement bears

against the wall of the opening 371, and in the other against the rounded surface of the cam projection.

In the operation of the mechanism, as the cam frame and plate move to the left (Fig. 8) the roller rides along the straight side of the cam and the pusher head 365 engages the end of a carton and pushes the carton, and two other cartons in front of it, forwardly between walls 240 and 241. In the return movement of the frame and plate, the roller passes along the rounded surface of the cam, causing the lever 368 to swing and this movement, through the linkage, moves the pusher head out of the guide-way as indicated in dotted lines in Fig. 7, so that its longitudinal face is flush with the inner surface of the wall 240 and the guide-way is free to receive another carton from the communicating guide-way. When the cam frame reaches the end of its return movement, the lever again assumes the position shown in Fig. 8, and the pusher head is swung into feeding position.

The cartons moving along the guide-way defined by walls 240 and 241 have their end walls in contact. The packing stations at which the two end cartons are to be filled are separated, so that the cartons must similarly be spaced before being advanced to the packing stations. For this purpose there is a hollow suction head 376 at the end of the guide-way having perforations 377 in the front face, the head being connected by a pipe 378 to the suction chamber 243. The head normally lies in such a position that the feeding movement of the head 365 causes a carton to be advanced into contact with the suction head, the end wall of the carton being gripped by the suction face of the head. Secured to the rear of the head is a rod 379 projecting through a guide block 380 and the head is held normally in advanced position by a coil spring 381 encircling the rod. The end of the rod is bent downwardly at 382 through a slot 383 in the bed plate and lies in the path of a pin 384 on a disc 385 on a shaft 386. As the shaft is rotated, the pin moves the head from full line to dotted line position (Fig. 42), drawing the end carton away from the one next to it by the desired amount.

The shaft 386 is journaled in suitable bearings on the under side of the bed plate and at one end carries a gear 387 meshing with a gear 388 on the end of the shaft 389 journaled in suitable bearings and driven intermittently from the shaft 269 by gears 390 and 391, one of these gears having blank sections, as shown in Fig. 9. The shaft 386 makes one rotation for each two rotations of the shaft 269.

The two end cartons in the guide-way defined by walls 240 and 241, separated by the mechanism described, are now pushed for-

wardly to the packing stations along spaced guide-ways formed by outer guide walls 392 and 393 and a central guide wall 394. The cartons are fed by means of a pusher plate 395 having top and bottom edge flanges 396 and 397. This pusher plate normally lies within a recess 398 in the wall 240, so that the cartons can be advanced to a position in front of it. The wall at this point is of skeleton form.

The pusher plate is provided with feeding arms 399 and 400 which extend through a suitable opening in the wall, the arm 399 being pivotally secured to one end of the pusher plate, and the arm 400 being similarly connected to the plate intermediate its ends. The arm 400 is secured at one end to the end of a slide bar 401 (Fig. 26) reciprocating in a guide 402, and on the upper surface of the bar 401 slides a second bar 403 connected to bar 401 by a slot and pin connection 404, 405. The arm 399 is connected to the outer end of the bar 403 and when the bar 401 is reciprocated to the right (Fig. 26) the bars are moved together so that the plate 395 engages a pair of cartons which lie in a line and advances these cartons abreast in the separate guide-ways to the packing station. Upon the reverse movement of the bar 401, it moves independently of the bar 403 for a distance corresponding to the length of the slot, so that the plate is swung about the end connected to arm 399 as a center. Its free end is thus retracted in advance of the connected end, moving out of the way of the cartons being advanced to a position in front of the plate, the plate being swung to normal position at the end of its retractile movement.

The end of the bar 401 is flexibly connected by a link 406 to the slotted end 407 of a lever 408, this lever cooperating with a cam groove 409 of the barrel cam 410 and having latch mechanism, presently to be described, by which the lever is rendered inoperative throughout certain rotations of the cam.

The barrel cam 410 is mounted loosely on the main shaft 158 and is driven therefrom by the countershaft 269 through a gear 411 secured to the shaft 269, an intermediate gear 412 journaled on the stud shaft 413, and a gear 414 secured to the end of the cam. The lever 408 is pivotally mounted upon a stud shaft 415 (Figs. 15, 16) having a rotatable bushing 416 at its lower end in the cam groove 409. Between the bushing and the lever is pivotally mounted on the stud shaft the end of a rock lever 417 having a hub end 418 pivotally journaled upon a vertical shaft 419 suspended from the bed plate. On the end of the lever 408 is an arcuate head 420 which slidably engages an enlargement 421 of lever 417 below a retaining arm 422, projecting from the hub 418. On the lower end of the shaft 419

and between the flange 423 and a head 424 on the extremity of the shaft is pivoted a lever 425 held in position against flange 423 by a coil spring 426. The lever carries a locking pin 427 which extends through a passage 428 in the enlargement 421 of lever 417 and in its upper position (Fig. 15) the pin projects into a socket 429 in the arcuate head 420 and thus locks the levers 408 and 417 together.

On the hub of lever 425 are upper and lower flanges 430 and 431 engaged by trunnion pins 432 in the forked end of a lever arm 433 secured on a horizontal rock shaft 434 supported in suitable brackets upon the bed plate. A rock lever 435 is secured upon the shaft and at its end carries a roller 436 which rides upon the surface of a cam 437 on a shaft 438 supported in suitable bracket bearings and driven by the shaft 158 by suitable gearing. The gearing is so arranged that the cam has one rotation for every four rotations of the shaft 158, and this cam is so formed that during three-quarters of the rotation of the cam the arm 435 depresses the lever 425, thus releasing the levers 408 and 417. When thus released, the lever 408 is oscillated about its pivotal connection to the bar 401 by the action of the cam, but causes no movement of the bar. At the same time the lever 417 is swung about its shaft 419. During the remaining quarter turn of cam 437, the two levers are locked together and are thus rocked as a unit by the cam 410. This rocking movement causes a movement of the lever 401 and the cartons are moved into position to be filled, by head 395.

The packing mechanism as illustrated is arranged to pack two cartons simultaneously, each carton receiving twelve biscuits arranged in four layers of three biscuits each, with a strip of paper inserted between adjacent layers. The biscuit feeding mechanism is actuated by the barrel cam 410 which has a cam groove 39 engaged by a bushing 440 on a lever arm 441 pivotally mounted on the bed plate at 442 and connected at its other end by a link 443 to a slide bar 444 mounted to reciprocate in a guide-way 445 (Figs. 9, 25) secured to the under side of the bed plate. At its forward end the bar 444 has an offset portion 446 (Figs. 9, 12) in which is journaled an elongated shaft 447, the offset portion 446 also having an upstanding arm 448 which, at its upper end, is provided with a sleeve 449 in which is housed a shaft 450 carrying a rocker arm 451 connected by a rod 452 to a rock lever 453 on the end of the shaft 447. Upon the inner end of the shaft 450 is mounted a feed bar 454 which rests upon a plate 199 upon which the biscuits are fed by the removal mechanism in groups of six.

The biscuits are deposited by this removal

mechanism in front of the bar 454 which feeds the biscuits forwardly into openings 455 and 456 above the cartons to be filled. In the plate 109 is a glass insert plate 457 so that the position of the cartons beneath the plate may be observed. On the front face of the bar 454 are mounted plates 458, 459, carried on springs 460, these plates engaging the biscuits lightly and moving them forward as the plate advances.

The shaft 447 is slidable in a bracket 461, depending from the bed plate, and is connected to the bar 444 to reciprocate therewith by means of an arm 462 extending from the bar 444 and having a portion through which the shaft extends, retaining collars 463 on the shaft being placed on either side of the arm. At its inner end the shaft is provided with a gear 464 having a spline entering an elongated slot 465 in the shaft 309, this connection permitting the movement of the shaft lengthwise with reference to the gear but connecting the two rigidly for rotation. The gear 464 is intermittently rotated by means of a segmental gear 466 carried on a shaft 467 mounted in suitable bearings beneath the bed plate of the machine and continuously rotated by means of a sprocket gear 468 and a sprocket chain 469 from a sprocket gear 470 on the shaft 269.

When the biscuit feeding bar 454 reaches the end of its feeding movement, the gear 466 meshes with the gear 464 and turns it through a partial rotation. This causes a movement of the rock arms 451 and 453, resulting in the feed bar being swung upwardly about the shaft 450 as a pivot. The feed bar remains raised until it returns to its retracted position, whereupon the segmental gear 466 is disengaged from the gear 464 and the feeding bar is permitted to drop back into its lowered position. The raising of the bar permits the next group of biscuits to be fed into place before the feeding bar has been fully retracted, and as the feeding bar thus moves forward and backward, biscuits are placed in position to be fed during the backward movement of the bar and these biscuits are advanced to the packing station in the forward movement of the bar.

The cartons fed forwardly in the separate guide-ways by means of the pusher plate 395 are supported on a floor plate 471 having openings 472 and 473. When the cartons are in position, a collapsible platform is projected through each opening into the carton, expanding near the top of its upward movement to provide a support for a layer of biscuits. As each layer of biscuits is received by the platform, the latter is lowered by a step, the operations continuing until the carton is filled. In the last step in the downward movement of the platform it is collapsed and withdrawn from the bot-

tom of the carton and the filled carton is then ejected from the packing position by suitable mechanism.

The packing mechanism, (Figs. 27-36) includes a shelf 474 suspended below the bed plate 471 by tubular posts 475, 476, 477, 478, and a frame 479 provided with apertured corner pieces 480 through which the posts extend, is mounted for sliding movement on the posts. On the under side of the frame are secured downwardly extending posts 481, 482, connected at their lower ends to arms 483, 484 of a piston rod 485 connected to the piston head 486 slidable in a suction cylinder 487 supported from the shelf 474 by hanger rods 488 and having a connection at its upper end to a vacuum chamber by a pipe 489. The suction above the piston tends to move it upwardly at all times to raise the frame to its uppermost position.

At the ends of the frame are racks 490, 491, having four teeth engageable by pawls 492 carried on vertically reciprocating shafts 493 and 494 mounted in sleeves 495 and 496, these sleeves being mounted for vertical movement relative to the shafts. Guide collars 497 on the plate 471 support the upper ends of the sleeves, while the lower ends slide in apertures 498 of the shelf 474. Each pawl 492 is pivotally mounted in an opening 499 of the shaft and a leaf spring 500 normally forces it through a slot 501, in the sleeve to a position in which it engages the rack.

The lower ends of the shafts 493 and 494 project beyond the ends of the sleeves and are connected to the ends of a cross beam 502 having a central roller 503 which is engaged by a cam 504 on a shaft 505 journaled in suitable bearing brackets 506 and driven from the main shaft 269 by sprocket gears 507 and 508 and a sprocket chain 509.

The upper ends of the shafts extend above the plate 471 and are provided with shoulders 510 against which bear helical expansion springs 511, bearing at their other ends against the plate and exerting a lifting force on the shafts which retain the roller 503 in engagement with its cam. The rotation of the cam causes the intermittent raising and lowering of the shafts and the pawls successively engage the racks to force the frame downwardly one tooth of the rack at a step.

The posts 475, etc., are provided longitudinally on their outer sides with a series of openings 512 having the form of teeth, and within each of the posts is a slide bar 513 having a groove 514 in which are mounted spaced blocks 515 provided with projecting teeth portions 516 oppositely inclined to the teeth 512. Each bar is arranged to be moved upwardly relatively to the posts by a suitable mechanism so that the teeth 516 are

brought into such relation to the teeth 512 that a substantially unbroken outer surface on the posts is provided. When the strips are lowered the teeth are separated so as to form recesses which may be engaged by pawls 517 in slots 518 in corner blocks 480, the pawls being held yieldably in position by leaf springs 519.

The ends of the rods 513 extend below the shelf 474 and are connected in pairs by bars 520 and 521 secured to the rods by set-screws. Rock shafts 522 and 523 mounted in suitable bearings depending from the shelf 474 carry yoke members 524 and 525 which embrace the sleeves 495 and 496 and have slots 526 in their arms which engage trunnion pins 527 provided on the ends of the sleeves. At the outer sides of the bearings the rock shafts carry yoke members 528 and 529, each comprising side arms and a connecting bar, the connecting bars engaging the bars 520 and 521 from beneath. At one end of each rock shaft is a lever arm 530 and 531, these arms being connected by links 532 and 533 to the arms of a rock lever 534 on the end of a shaft 535 mounted in suitable bearings. At the end of the shaft 535 is a lever 536 connected by a link 537 to one end of a lever 538 suitably journaled in a bracket depending from the bed-plate. The end of the lever 538 enters a cam slot 539 provided in the end of the slide bar 401 (Figs. 25, 26).

In the operation of the mechanism for raising and lowering the frame, when the frame is in its uppermost position the pawls 492 engage the lowermost teeth of the racks 490 and 491 and as the cam 504 rotates, the shafts 493 and 494 are reciprocated, causing the pawls to move the racks downwardly by the amount of one tooth at each reciprocation. At each step in the downward movement of the frame, the latter is held against return upward movement after it is released by the pawls by means of the pawls 517 entering the teeth 512. The frame is thus moved downwardly with an intermittent movement of four steps, and when it reaches the end of its downward movement it is restored to its uppermost position in a single step. To permit such movement, the lever 538 is swung by the cam slot, and through the linkage rocks lever arms 530 and 531, which raise the cross bars 520 and 521 and with them the shafts 513, thus raising the toothed blocks 515 from the position shown in Fig. 30 to that shown in Fig. 29, the pawls 517 being forced out of engagement with the teeth. At the same time the yoke members 524 and 525 swing downwardly, drawing the tubular posts 495 and 496 downwardly so that the upper ends of each slot 501 forces the pawl 492 into the opening 499 collapsing spring 500 and thereby releasing the frame (Fig.

33). The frame is now free to move upwardly and is so moved by the action of the suction cylinder.

The frame 479 (Fig. 27) carries a pair of collapsible platforms which are of similar construction, so that but one need be described. Each platform comprises telescoping plates 540 and 541, the plate 540 having side flanges 542 which embrace the side edges of the plate 541. The plates are supported on upright arms 543 pivotally connected at their lower ends at 544 to the frame and at their upper ends to the under sides of the plates at 545. Two of the arms are connected to the outer end of each plate, and one of the arms is connected centrally at the inner end of the lower plate, this latter arm preventing the tilting of the plates in their collapsing or expanding movements. Slots 546, 547, are formed in the plate 541 to permit the plate to be moved together to the collapsed position. A cross bar 548 connects the arms supporting one plate of one of the platforms and a link 549 connects this cross bar to a cross bar 550 connecting similar arms supporting the same plate of the other platform (Fig. 27). The other pair of arms of the first platform are connected by a cross bar 551 connected by a link 552 to the end of a link 553, the other end of which is connected to a cross bar 554 connecting the other pair of arms of the second platform.

A transverse shaft 555 mounted in the frame carries a bell crank lever having three arms. Arm 556 is connected with the link 549, arm 557 is connected to the connection between links 552 and 553, and arm 558 carries a roller 559 which lies between the ends of vertical stop posts 560 and 561 provided on the plate 471 and the platform 474, post 561 projecting through an opening in the base of the frame in the lowered position of the latter.

As the frame is raised to its upper position, the roller 559 strikes the post 560 (Fig. 31) and the bell crank lever is rocked clockwise. Through the linkage this causes the arm supporting the plates of the two platforms to swing and move the plates to expand the platforms. When the frame is lowered step by step the roller eventually strikes the lower post, rocking the bell crank in the opposite direction and causing the platforms to be collapsed so as to pass through the openings in the plate 471. When the platforms have thus been moved out of the lower ends of the cartons, the latter are completely filled and feeding mechanism is operated to remove the filled cartons and bring empty cartons into position. When this occurs, the cam 539 through the mechanism described, releases the frame and the latter is drawn to its upper position by the action of the suction

cylinder, the platforms entering the cartons and expanding to form surfaces to receive biscuits.

Above the cartons in position to be filled is a vertically reciprocating bar 562 provided with a series of curved plates 563 which are arranged to engage the separate biscuits and to hold these biscuits against movement when the platforms lower the biscuits into the cartons. The bar 563 is supported at its ends on end blocks 564 and 565 which are carried on the upper ends of the vertical slide rods 566 which are guided through projecting portions 567 of the walls 392 and 393 and are connected beneath these portions by cross pieces 568.

At the upper ends of the shaft 493 and 494 (Fig. 37) there are reduced extensions 569 which project through openings centrally of the cross pieces and provided at their upper ends with enlargements between which and the cross pieces are helical expansion springs 570. As the shafts move downwardly to lower the frame step by step, the connection of the frame with the cross bar 528 permits the latter to partake of the initial downward movement, but the shafts continue their down stroke after the bar is stopped by abutment of the stops 571 against the upper surfaces of the walls 392 and 393.

The layers of biscuits within the cartons are separated by strips of paper which are placed in the cartons beneath each layer of biscuits, the proper length of paper being cut as each layer is fed downwardly. The paper feeding mechanism includes supporting standards 572 and 573 (Figs. 25, 27), at the sides of the walls 392 and 393.

Guide rollers 574 and 575 are mounted on suitable shafts on the standard 572 and rollers 576 and 577 are similarly mounted on standard 573. A strip of paper drawn from a supply roller 578 on standard 572 is fed between rollers 574 and 575 and another supply roll 579 is mounted on this standard, from which the strip is drawn around a guide roller 580 in the upper end of standard 573 and thence downwardly between rollers 576 and 577. The rollers 575 and 577 are intermittently operated to feed the proper lengths of paper by sprocket connections with the intermittently rotated shaft 389 (Fig. 25) the connections consisting of a sprocket pinion 581 secured to the shaft of roller 575 which is connected by a sprocket chain 582 to a sprocket gear 583 on a shaft 584 mounted below the bed plate and a sprocket pinion 585 on the shaft of roller 577 connected by a chain 586 to a sprocket gear 587 on the shaft 389. The shaft 584 is driven in correspondence with shaft 389 by a sprocket chain 588, extending around sprocket gears 589, 590 on the respective shafts. The feed rolls draw paper from

the supply rolls and feed the paper across the tops of the cartons being packed. When strips of the desired length have been drawn from the supply, these strips are severed by means of knife blades 591 and 592 secured on the inner sides of the end blocks 564 and 565 and cooperating with the inner edges of the walls 392 and 393.

When the cartons are filled they are moved forwardly through the guide-ways formed by walls 392, 393, and 394, to permit empty cartons to be fed to filling position, and the filled cartons are moved by ejecting mechanism so that their weight will not cause the collapse of the cartons advancing to be filled. The walls 392, 393, and 394 are slotted (Fig. 37) and in these slots are reciprocating feed bars, generally designated 593. The bars are of similar construction. On the outer side of the wall 392 is pivotally mounted a lever arm 594 connected by a link 595 to the bar 401 and connected intermediate its ends by a tie rod 596 to a lever 597 pivotally mounted on a bracket 598 extending downwardly from the bed plate of the machine. The upper end of the lever 597 is connected to the jointed ends of links 599 and 600, the link 599 being connected to the end of a feed bar 593, while the link 600 is connected to the lower end of a lever 601 secured to a rock shaft 602 journaled in suitable brackets on the upper surfaces of the walls of the guide-ways and extending across them. At its other end the rock shaft is provided with a lever arm 603 connected by a link 604 to another of the bars 593 and intermediate its ends it is provided with a lever arm 605 which extends downwardly in an opening 606 of the wall 394 and is connected by a link 607 to the other bars 593. Thus as the bar 401 is reciprocated to feed empty cartons to filling position, the bar, through the linkage described, causes a reciprocation of the feed bars 593.

The construction of these bars is illustrated in Figs. 38-41. Each bar is made up of two parts 608 and 609 which have a limited relative movement through the pin and slot connection 610 and 611. As the part 608 is positively reciprocated in one direction or the other, it has a limited initial movement independently of the other part 609, but thereafter the two parts move as one. The part 609 has a series of openings 612 in each of which is a finger 613 pivotally mounted at its forward end upon a pin 614 and at its rear end having a tooth 615 of such size that it may be drawn entirely into the opening when the finger is swung on its pin. Each finger 613 is connected to the part 608 by a link 616 in a slot 617 of the part 608 and pivotally mounted on a pin 618.

As the part 608 is reciprocated rearwardly to feed cartons, its initial movement inde-

pendent of part 609 forces the fingers out of the openings 612, so that the teeth of the fingers engage one of the cartons. The continued movement of the two parts of the bar in unison then causes the cartons to be fed to the rear, the bar 395 at the same time feeding the empty cartons into position to be filled through the reciprocation of the bar 401. In the reverse movement of the part 608 its initial movement relative to the part 609 causes the fingers to be withdrawn into the pockets, where they are held until the forward movement again begins.

As the cartons are fed to the rear by the ejecting mechanism, their upper end flaps are turned inwardly over the tops of the cartons by folding devices 619, 620, 621, 622 (Figs. 7, 27) these devices being so shaped as to enter between the flaps which are folded down against the ends of the cartons and to turn the flaps inwardly over the upper ends of the cartons, where the flaps are held thereafter by holding-down wires 623. The intermediate folding devices 620 and 621 are combined, as shown in Fig. 7 and the folder 621 is placed in front of the folder 620 so that the flaps of the cartons in the right-hand guide-way will be folded before the flaps of the cartons in the left-hand guide-way, thus preventing interference between the flaps in the folding operation.

The cartons fed through the guide-ways from the packing station are received upon a longitudinal platform 624 (Fig. 48) mounted upon supports 625 and provided with guide flanges 626 and 627 which extend along the edges of the platform for a portion of its length to retain the lower side flaps of the cartons folded upwardly. An endless conveyor chain 628 running around sprocket wheels 629, 630, carries spaced arms 631 which are moved over the platform 624 with a step by step movement, so that as two cartons are moved upon the platform a feeding arm engages these cartons and moves them along the platform, the extent of the movement being sufficient to permit the next pair of cartons to be moved to position during the period of movement of the chain. The chain is driven from the shaft 269 by means of an intermittent spur gear 632 which meshes with a pinion 633 upon the shaft of sprocket 629 and is mounted upon a vertically disposed shaft 634 which is provided with beveled pinion 635 meshing with a beveled gear 636 on the end of the shaft 269.

Beyond the flanges 626 and 627 the platform is provided with a raised extension 637 (Fig. 48) overlying the end of a longitudinal platform 638 and slightly spaced therefrom, as indicated at 639. As the cartons are fed along the platform 624 upon the portion 637 between flanges 626 and 627, they are presented to the flap-turning mem-

bers 640 and 641 mounted on the end of the platform 638 and arranged to turn the side flaps of the cartons inwardly at top and bottom. These flap-turning members are provided at their sides with projecting fingers 642, 643, having their forward edges sharpened and arranged to enter between the flaps and the sides of the cartons, the upper edges of the members 642 and 643 being curved so that the flaps are turned inwardly, the lower flaps being first folded beneath the extension portion 637 of platform 624 and then passing through the space 639 upon the platform 638. A holding-down wire 644 (Fig. 7) extends above the platform 625 to the flap-turning member 640 and serves to hold the inwardly turned end flaps in their down position. Similar holding-down wires 645 and 646 extend from the member 640 above the platform 638 and hold the side flaps in their down position until the cartons are presented to the sealing devices. These devices paste sealing strips along the adjacent edges of the side flaps across the space between them and the ends of the paper strips overlie the folded-in end flaps, thus sealing the cartons and preventing the displacement of the flaps.

The sealing mechanism is illustrated in Figs. 49 and 50 and includes side plates 647 and 648 mounted on the platform 638 at each side of the cartons, the plate 647 being bent outwardly as at 649 to embrace the chain 628. These plates at their ends support mechanism for feeding and pasting the strips to be applied to the upper sides of the cartons and are provided with downwardly extending portions 650 and 651 beneath the platform 638 for supporting mechanism for feeding and pasting strips on the bottoms of the cartons. The two mechanisms are alike but in inverted relation, so that the description of the upper mechanism following applies equally to the lower mechanism.

On a shaft 652 is mounted a roll of pasting tape which is led between feed rollers 654 and 655 mounted on shafts 656 and 657, and thence beneath the pressure roller 658 which engages the upper sides of the cartons, this pressure roller being mounted on the shaft 659. The shaft 656 of roller 654 is yieldingly mounted in slots 660 in the side plates and forced toward the roller 655 by springs 661 so that it engages the paper tightly. A driving shaft 662 is journaled in the plates and carries pulleys 663 and 664 which are connected by belts 665 and 666 with pulleys 667 and 668 provided on the shafts 657 and 659 of the feed and pressure rolls respectively. The drive shaft 662 of the upper mechanism is driven from the corresponding drive shaft of the lower mechanism by a belt 669 which extends over pulleys 670 and 671, the drive shaft

of the lower mechanism being intermittently driven by the mechanism by which the carton feeding mechanism is driven by a sprocket chain 672 extending around a sprocket gear 673 on the lower driving shaft 602 and a sprocket gear 674 on the shaft 675 which is driven from the shaft 634 upon which the chain driving sprocket 629 is mounted, by beveled gears 676 and 677.

The strip fed by rollers 654 and 655 beneath the roller 658 is cut periodically in proper lengths by means of a stationary knife blade 678 mounted between supporting plates with its edge in proximity to the inner face of the paper strip, while at the outer side of the latter is a blade 679 transversely disposed and mounted on a reciprocating bar 680 slidable in the guide 681 and connected at its end to one end of a trip lever 682 upon a shaft 683, this lever being provided at its other end with a roller 684 engaging a cam 685 on the shaft 602. A spring 686 is connected at one end to a pin 687 of the guide block 681 and at its other end to a pin 688 on the bar 680 which moves in the slot 689 in the block 681. The spring holds the roller 684 in engagement with the cam, and as the shaft is revolved the cam intermittently trips the lever 682, moving the blade 679 to cooperate with the stationary blade 678 to sever the length of paper.

The paper preferably employed is gummed on one side and as it is fed, the gummed surface is moistened by a roller 690 engaging a roller 691 which is rotated in a water pan 693. These rolls may be positively driven or driven by frictional contact of the roller 690 with the surface of the tape. As the cartons are fed through the strip-pasting devices, they advance along the platform 638 and are removed from the machine as the arms 631 pass around the sprocket gear 630, the filled cartons then being removed and delivered to the point where they are to be packed in cases.

The different associated devices in the apparatus are driven in suitable timed relation, and in the operation of the machine the shredding devices deposit a continuous cereal strand upon the strand conveyor, where the strand is divided into individual biscuits by the cutter chains. These biscuits are picked up by the upper cutter chain, carried out over the baking conveyor, and deposited in rows on the pans of this conveyor brought successively to rest beneath the depositing mechanism. The filled pans are carried through the oven and the drying chamber with a continuous movement and then are brought successively to rest beneath the delivery mechanism, where

the individual blades of that mechanism engage adjacent biscuits in a row and transfer a group of biscuits to the inspection platform. The group of biscuits are moved across this platform in successive steps to a position in front of the feed bar by which two sub-groups, in this case of three biscuits each, are moved simultaneously to the two cartons. The group of three biscuits forms a layer in a carton and this layer is lowered in place by the packing platform. After a layer is placed in the carton, the platform moves downwardly a single step and the operations continue until the cartons are filled, whereupon the filled cartons are ejected and empty cartons fed to filling position. During the packing operation collapsed cartons are withdrawn from the hopper and opened, and the opened cartons fed successively to the packing station. In this movement the bottom end flaps of the opened cartons are turned inwardly.

The operation of the carton opening and moving devices is so timed that while the packing devices are filling the cartons in a succession of operations, two empty cartons are placed in position in front of the packing station. Upon the next action of the parts, the filled cartons are removed, two empty cartons substituted in their places, and the packing platforms moved to the tops of these cartons to receive the first layers of biscuits. In the last filling operation for each carton, the platforms are withdrawn from the lower end of the cartons so that the cartons may be ejected. Beneath each layer of biscuits is placed a strip of paper, the paper being drawn from a supply and strips of the desired length severed from it. Passing from the filling devices, the cartons have their flaps folded appropriately to close the cartons, and thereafter a sealing mechanism operates to apply sealing strips to hold the flaps in closed position.

I claim:

1. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through, and out of the oven, a traveling feeding mechanism cooperating with a portion of the conveyor to deposit articles to be baked thereon, and a delivery device spaced from the feeding mechanism and cooperating with a portion of the conveyor lying outside the oven, this device having a movement transverse to the direction of movement of the conveyor and operating to remove the articles from the conveyor after they have been carried on the latter through the oven.

2. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through, and out of the oven, means for advancing the conveyor with a

continuous movement, means for giving a portion of the conveyor lying outside of the oven an intermittent advancing movement during the continuous movement of the remainder of the conveyor, a traveling feeding mechanism cooperating with the portion of the conveyor lying outside the oven to deposit articles to be baked upon a portion of the conveyor while it is at rest, and a delivery device spaced from the feeding mechanism lengthwise of the conveyor and operating in a direction transverse to the direction of movement of the conveyor to remove baked articles from a portion of the conveyor while it is at rest.

3. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through and out of the oven, a traveling feeding mechanism cooperating with a portion of the conveyor to deposit articles thereon in rows extending across the conveyor, and a delivery device spaced from the feeding mechanism and movable in a direction transverse to the direction of movement of the conveyor to withdraw groups of baked articles from the conveyor in single file.

4. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through, and out of the oven, means for advancing the conveyor with a continuous movement, means for advancing a portion of the conveyor lying outside the oven with an intermittent movement during the continuous movement of the remainder of the conveyor, a traveling feeding mechanism cooperating with a portion of the conveyor to deposit articles to be baked thereon in rows extending across the conveyor while said portion of the conveyor is at rest, and a delivery device spaced from the feeding mechanism lengthwise of the conveyor and operating to remove from a portion of the conveyor groups of articles arranged in single file while the said portion is at rest.

5. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through, and out of the oven, a traveling feeding mechanism cooperating with the portion of the conveyor lying outside the oven to deposit articles to be baked upon the conveyor, and a delivery device spaced from the feeding mechanism and cooperating with the conveyor, this device carrying a plurality of members each of which is adapted to engage an individual article and to remove this article from the conveyor upon the operation of the device.

6. In apparatus of the type described, the combination of an oven, an endless conveyor having a portion lying within the oven, a traveling feeding mechanism operable to deposit articles on the conveyor in rows ex-

tending transversely of the conveyor, and a delivery device spaced from the feeding mechanism and having a plurality of members arranged in line and each adapted to engage an article in a row across the conveyor, the delivery device being movable in a direction transverse to the direction of movement of the conveyor and in correspondence with this movement whereby the articles of a row on the conveyor are moved individually in single file from the conveyor.

7. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through, and out of the oven, a traveling feeding mechanism cooperating with a portion of the conveyor to deposit articles to be baked upon the conveyor, and a delivery device spaced from the feeding mechanism and cooperating with the conveyor to remove the articles from the conveyor after they have been carried on the latter through the oven and to deliver these articles to a selected point in successive steps.

8. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through, and out of the oven, means for advancing the conveyor with a continuous movement, means for giving a portion of the conveyor lying outside the oven an intermittent advancing movement during the continuous movement of the remainder of the conveyor, a traveling feeding mechanism operating to deposit articles to be baked upon a portion of the conveyor while it is at rest, and a delivery device spaced from the feeding mechanism lengthwise of the conveyor and operating to remove baked articles from a portion of the conveyor while it is at rest and to deliver the articles from the conveyor to a selected point in successive steps.

9. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through, and out of the oven, means for advancing the conveyor with a continuous movement, means for giving a portion of the conveyor lying outside the oven an intermittent advancing movement during the continuous movement of the remainder of the conveyor, a traveling feeding mechanism cooperating with a portion of the conveyor and operating to deposit articles on the conveyor in rows extending across the conveyor, and a delivery device spaced from the feeding mechanism lengthwise of the conveyor and operating in a direction transverse to the direction of movement of the conveyor to remove groups of baked articles arranged in single file from said intermittently advancing portion of the conveyor while it is at rest, this device being arranged to deliver these groups of ar-

articles to a selected point in successive steps.

10. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through, and out of the oven, means for advancing the conveyor with a continuous movement, means for giving a portion of the conveyor lying outside the oven an intermittent advancing movement during the continuous movement of the remainder of the conveyor, a traveling feeding mechanism cooperating with a portion of the conveyor to deposit articles on the conveyor in rows extending across the conveyor, and a delivery device spaced from the feeding mechanism and having a plurality of members arranged thereon in line and each adapted to engage an article in a row across the conveyor, said device being movable in a direction transverse to the direction of movement of the conveyor and in correspondence with the step by step advance of said intermittently advancing portion of the conveyor to remove a group of articles from the conveyor in single file, the device having a movement of less extent than the length of a row.

11. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through, and out of the oven, a continuously moving feeding mechanism operating to deposit articles to be baked on the conveyor, and a reciprocating delivery device spaced from the feeding mechanism and cooperating with the portion of the conveyor lying outside the oven, this device reciprocating in a direction transverse to the conveyor and operating upon each reciprocation away from the conveyor to remove articles therefrom after they have been carried on the conveyor through the oven.

12. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through, and out of the oven, a traveling feeding mechanism operating to deposit articles to be baked upon the conveyor, and a delivery device spaced from the feeding mechanism and cooperating with the conveyor to remove articles from the conveyor after they have been carried on the latter through the oven, this device including conveying means operating to transfer the articles out of the path in which they are removed from the conveyor to a packing station.

13. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through, and out of the oven, a traveling feeding mechanism operating to deposit articles to be baked upon the conveyor, and a delivery device spaced from the feeding mechanism and operating to remove articles from the conveyor after they have been carried on the latter through the oven, this device including reciprocating

conveying means operating to transfer the articles removed by said device out of their path of travel from the conveyor to a packing station.

14. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through, and out of the oven, a traveling feeding mechanism cooperating with the conveyor to deposit articles to be baked upon the conveyor, a platform outside the oven adjacent the conveyor and spaced from the feeding mechanism, and a delivery device outside the oven cooperating with the conveyor to remove articles from the conveyor after they have been carried on the latter through the oven and to deposit the articles upon the platform.

15. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through, and out of the oven, a traveling feeding mechanism cooperating with the conveyor to deposit articles to be baked thereon, a platform adjacent the conveyor and spaced from the feeding mechanism, and a delivery device cooperating with the portion of the conveyor to remove articles from the conveyor along a path transverse to the conveyor after the articles have been carried on the conveyor through the oven and to deposit the articles upon the platform, this device including conveying means for transferring the articles deposited upon the platform to a packing station.

16. In apparatus of the type described, the combination of an oven, an endless conveyor movable into, through, and out of the oven, a traveling feeding mechanism cooperating with a portion of the conveyor to deposit articles to be baked thereon, and a delivery device spaced from the feeding mechanism and operating in a direction transverse to the direction of movement of the conveyor to remove articles from the conveyor after they have been carried on the latter through the oven and to deliver these articles to a selected point in successive steps.

17. In apparatus of the class described, the combination of an oven, a conveyor movable into, through, and out of the oven, means for depositing articles to be baked on the conveyor, a delivery device operating to withdraw groups of baked articles from the conveyor in single file and to deliver these articles to a packing station, means for feeding cartons to the station, and packing mechanism at the station operating to introduce the delivered groups of articles into the cartons while maintaining the articles in the arrangement in which they were removed from the conveyor.

18. In apparatus of the class described, the combination of an oven, a conveyor movable into, through and out of the oven,

means for depositing articles to be baked in transverse rows on the conveyor, a delivery device operating transverse to the conveyor to withdraw groups of baked articles from the conveyor in rows in single file and to deliver these articles to a packing station, means for feeding cartons to the station, and packing mechanism at the station operating to introduce the delivered groups of articles into the cartons while maintaining the articles in the arrangement in which they are removed from the conveyor. 10

In testimony whereof I affix my signature.

HENRY ALONZO HOUSE.

July 13, 1926.

1,592,797

E. P. WEBSTER

BISQUIT DEPOSITING MEANS

Filed March 11, 1925

4 Sheets-Sheet 1

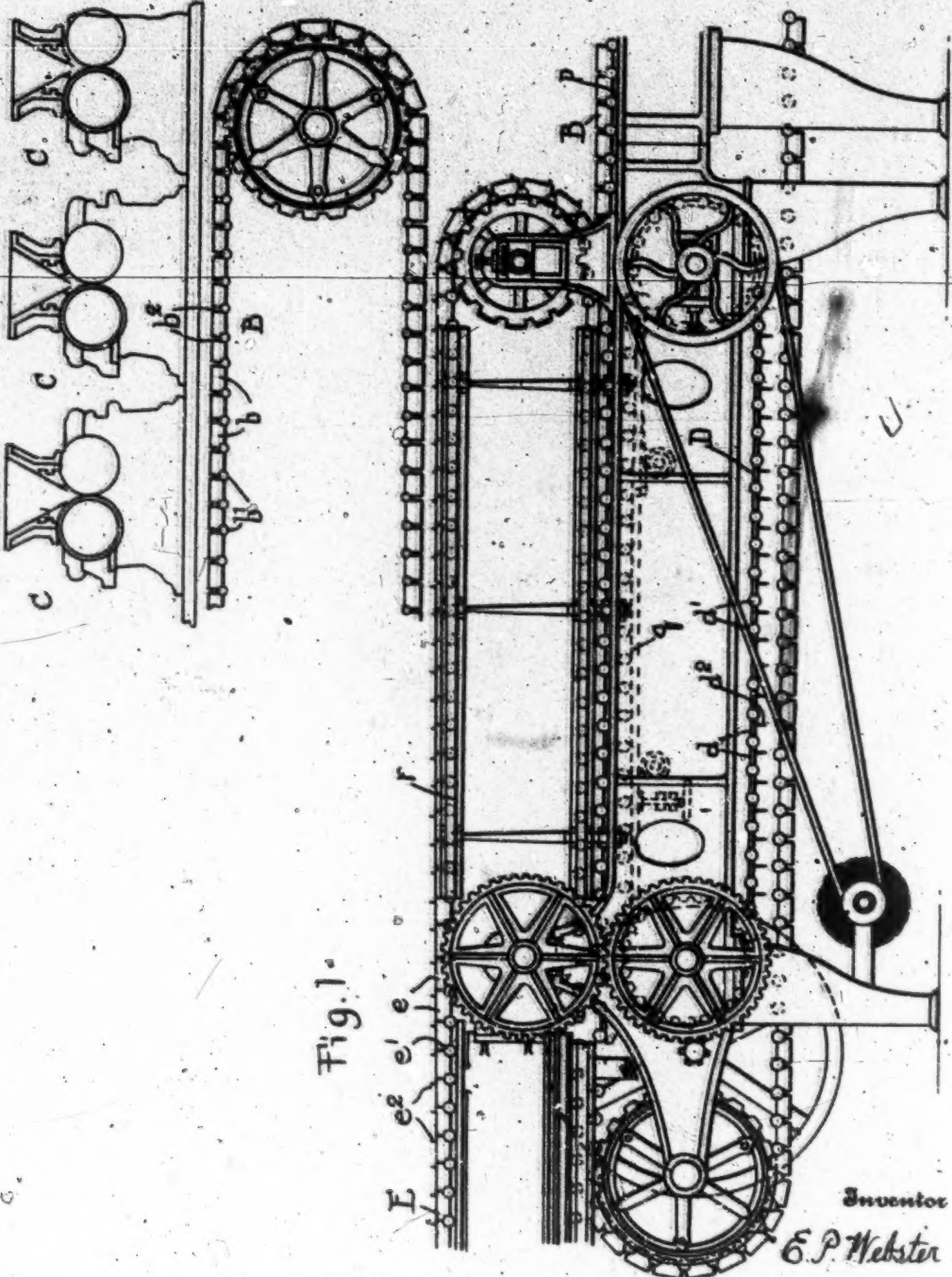


Fig. 1.

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July 13, 1926.

1,592,797

E. P. WEBSTER

BISCUIT DEPOSITING MEANS

Filed March 11, 1925

4 Sheets-Sheet 2

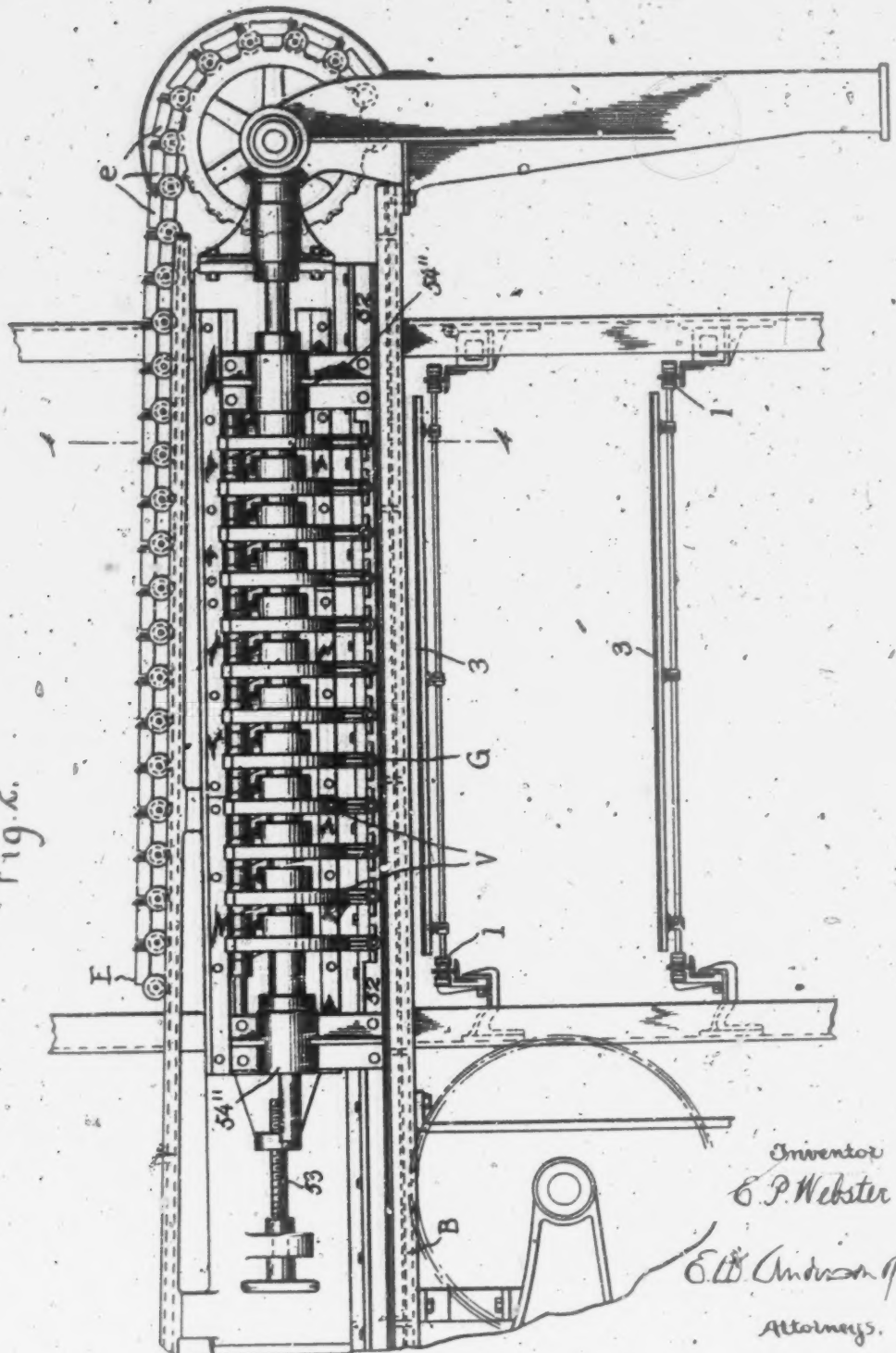


Fig. 2.

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E. P. WebsterE. B. Anderson for
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July 13, 1926.

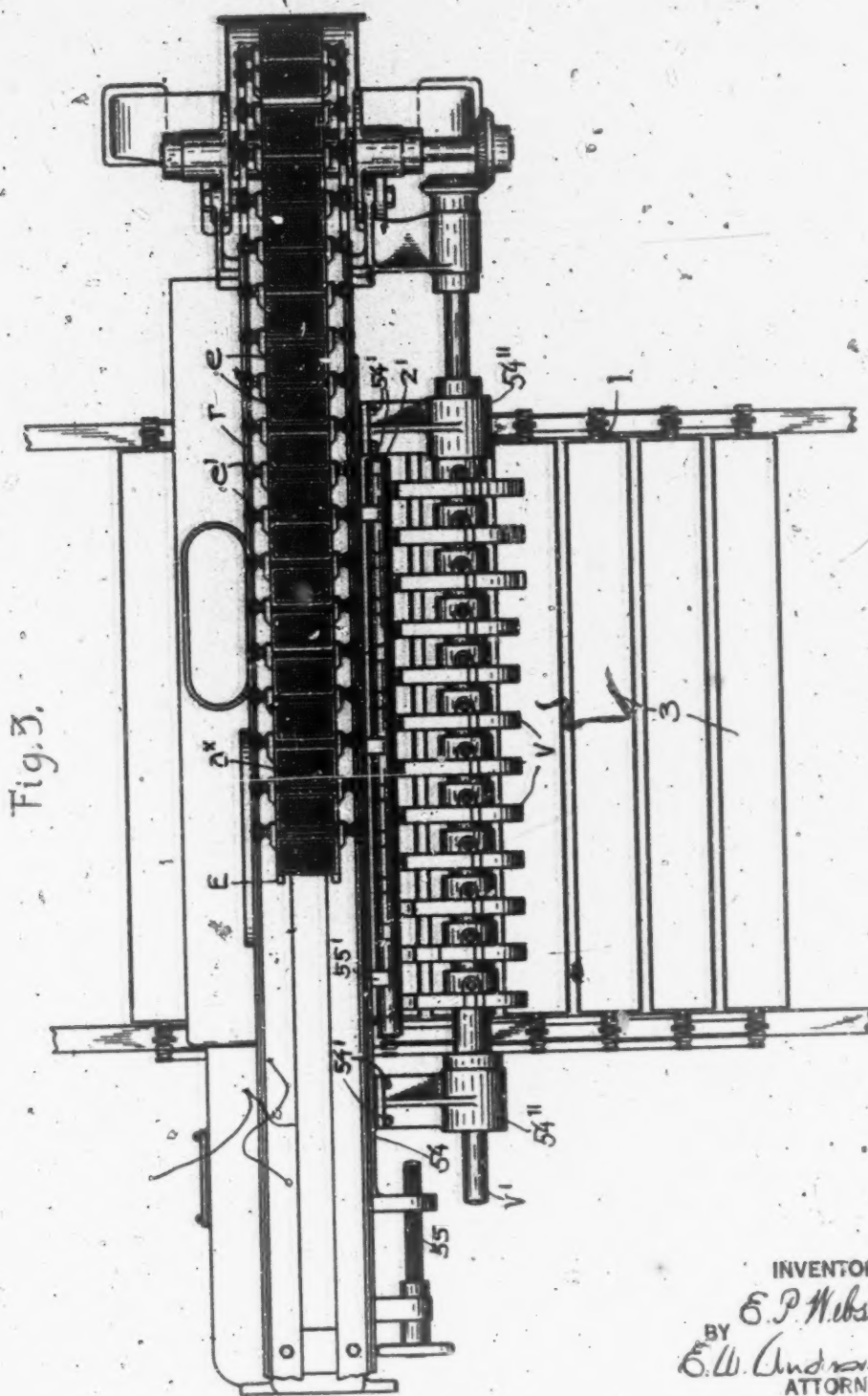
E. P. WEBSTER

1,592,797

BISCUIT DEPOSITING MEANS

Filed March 11. 1925

~~4 Sheets-Sheet 3~~



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Patented July 13, 1926.

UNITED STATES PATENT OFFICE.

EARL P. WEBSTER, OF NIAGARA FALLS, NEW YORK, ASSIGNOR TO THE SHREDDED WHEAT COMPANY, OF NIAGARA FALLS, NEW YORK, A CORPORATION OF NEW YORK.

BISCUIT-DEPOSITING MEANS.

Application filed March 11, 1925. Serial No. 14,727.

This invention relates to the manufacture of food products by automatic machines in which the products are continuously formed by suitable devices, deposited on a conveyor and carried through a baking oven. The present invention has to do more particularly with the mechanism by which the uncooked products are deposited on the conveyor, and affords means for adjusting the depositing means so that the products will be properly centralized and positioned in the receptacles on the conveyor in which they are to be baked. For purposes of illustration, the device of the present invention will be described in connection with mechanism used in the manufacture of cereal biscuits of the shredded wheat type, but it is to be understood that its utility is not limited to any particular product.

In the manufacture of shredded wheat biscuits, the cereal grain is shredded by suitable devices and deposited in the form of a continuous strand upon a conveyor. The strand, while being conveyed, is subdivided into individual biscuits which are carried to a position above the pans of the baking conveyor and then discharged in transverse rows upon the pans. The transfer of the biscuits from the strand conveyor to the pans may be accomplished by means of an endless chain having hollow links, these links being brought into contact with the upper surfaces of the biscuits on the strand conveyor and suction applied to remove the biscuits from the strand conveyor and carry them along in position on the surfaces of the hollow links. The chain extends out over the baking conveyor and as each pan is brought to rest beneath it, a row of biscuits held against the links is carried out over the pan; then all the links are shut off from the vacuum and the row of biscuits dropped upon the pan.

The mechanism for effecting the transfer includes a suction chamber lying above the hollow links and a plurality of valve plates are used to control the vacuum. These plates are moved successively to place the chamber in communication with the links as the latter move along the chamber until the time for deposition occurs, when all the plates are moved to closed position simultaneously. In order to insure that the row

of biscuits is properly centralized in the pan, mechanism is included to move the plates and their actuating devices to different positions of adjustment relative to the chamber and the present invention has to do with improved adjusting means for the purpose. A depositing device of the general type but without the improvement, is illustrated in Patent No. 678,625, issued July 16, 1901, to H. D. Perky, and this invention permits the utilization of the Perky device in connection with a baking conveyor having a series of pans to be filled successively.

For a better understanding of the invention, reference will be made to the accompanying drawings, in which

Fig. 1 is a side view of the shredding devices, the strand conveyor, and the cutter mechanism,

Fig. 2 is a complementary side view from the opposite side, showing the means for depositing the biscuits upon the baking conveyor,

Fig. 3 is a plan view of the depositing mechanism,

Fig. 4 is a transverse view on the line 4-4 of Fig. 2, and,

Fig. 5 is a detail in perspective of a pair of links of the cutter chain.

Referring now to the drawings, the baking conveyor B is shown as made up of links *b* connected by pivots *b'*, these links being spaced apart as indicated at *b''*. This strand conveyor B is endless and at one point passes beneath a plurality of shredding devices C, which continuously form a cereal strand and discharge it upon the conveyor B. The conveyor B runs on a track *p*, and at one point in its travel, passes between upper and lower cutter chains E and D. The chain E is made up of links *e* connected by pivots *e'*, these links being provided with cutter blades *e''*, and this chain runs over a track *r* in its upper stretch. In its lower stretch its links lie in contact with the strand on the conveyor B. The second cutter chain D lies within the loop of the strand conveyor, and it is made up of links *d* connected by pivots *d'*, these links having cutter blades *d''* which are arranged to cooperate with the cutter blades *e''*. The upper horizontal stretch of the cutter chain D rides over a track *q* in close proximity to the under side of the

links of the chain B. The cutter chains are arranged so as to pass through the spaces δ^2 of the strand conveyor chain, and the blades divide the strand into individual biscuits.

The upper cutter chain extends at one end a considerable distance beyond the end of the strand conveyor, and this end overlies a baking conveyor 1, provided with transverse pans 3. In this extension of the chain is a housing provided with a vacuum chamber H and a compression chamber H'. The lower walls of both chambers have slots m which lie close to the rear surfaces of the links e of the upper cutter chain. These links are hollow and have openings f in the rear walls through which the interior of the links may be placed in communication with the chamber H or H'. The faces of the links are closed by screens ax , and the chain runs on tracks r which hold the links in close proximity to the walls of the chambers.

Mounted in a slide 52 beneath the chambers H, H' are valve plates G, these plates moving in seats g^2 . The valves have openings such as g' , separated by blank spaces g^2 , and may be moved so that one or the other of the chambers H, H' is cut off from the links e , while the other is in communication with the links. The valve seats g assist in guiding the valve plates in their movement. Each plate carries an extension l surrounded by a spring which bears at one end against the plate and at the other against an extension from the slide 52. Each plate also has a part which may be acted on by a rocker arm Z mounted for swinging movement on a slide 54, and rotary cams V on a shaft V' driven from a suitable source of power, actuate the arms Z and serve to move the plates to place one or the other of the chambers H, H' in communication with the links at the desired instant. As the biscuits reach the end of the strand conveyor, the first valve plate in the series is moved to open the suction chamber and this biscuit is picked up and held against the under surface of a link e . As the link moves beneath the next plate, this plate is moved so that as the operation progresses a succession of biscuits, each of which is held against a link e by suction, is continuously moved out over a pan 3. When the row of biscuits is sufficient to fill the pan, all the valve plates are moved simultaneously to shut off the vacuum chamber from the links and connect the pressure chamber thereto. This substitution of pressure for vacuum causes the row of biscuits to be deposited on the pan.

In order to adjust the mechanism so that the biscuits may be properly centralized in the pans, a single adjusting device is provided by which the entire series of valve plates and the entire series of operating cams

and arms may be adjusted lengthwise of the chambers so that the deposition of biscuits will occur at the right instant to centralize these biscuits with reference to the pans 3. For this purpose, the slide 54 is provided with an adjustment screw 55 and the slide has bolted thereto at 54' a bracket 54'' which carries the shaft V' on which the cams are mounted. The shaft Z', on which the rocker arms are mounted, is similarly supported on lugs 55' of the slide. A slide 52 which carries the valve plates G, is secured to the slide 54 by means of the end brackets 54'' which extend downwardly to the slide 52 and are bolted thereto. With this arrangement consequently, the operation of the single adjustment screw permits all the valve plates and their operating devices to be moved to different positions lengthwise of the chamber H, H', and thus by a single adjusting means the centering of the row of biscuits in the pans is readily secured.

I claim:—

1. Mechanism for depositing biscuits which comprises a conveyor for carrying biscuits, a second conveyor movable at an angle to the first, and means for depositing successive groups of biscuits upon the second conveyor from the first, this means including a suction chamber overlying a stretch of the first conveyor and having openings, a series of valve plates controlling the openings, a series of operating devices for the plates, and means for simultaneously adjusting the entire series of plates and their operating devices relative to the second conveyor to centralize the groups of biscuits deposited on the second conveyor.

2. In mechanism for depositing biscuits, a conveyor, a second conveyor, means for depositing successive transverse rows of biscuit upon said second conveyor from the first named conveyor including a suction chamber overlying the lower stretch of said first named conveyor and having openings, a slide, a series of valve plates carried thereby and controlling said openings, a second slide, and a series of operating arms and cam devices for said valve plates carried thereby, and means for adjusting simultaneously the entire series of valve plates and the entire series of operating arms and cam devices relative to the said second conveyor to centralize the deposit of the biscuit rows thereon including means of connection for said slides and a single adjustment device only connected to one of said slides.

3. In mechanism for depositing biscuits, a conveyor carrying a succession of biscuits, a second conveyor for receiving groups of biscuits, the two conveyors extending at an angle with the lower stretch of the first conveyor lying in proximity to the upper stretch of the second conveyor, a suction

chamber overlying the lower stretch of the first conveyor and having openings through which the links of the conveyor are in communication with the interior of the chamber, a series of valve plates controlling these openings, a series of operating devices for the valve plates, and means for simultane-

ously adjusting the position of all the plates and all the operating devices therefor with reference to the second conveyor to central- 10
ize the groups of biscuits deposited thereon.

In testimony whereof I affix my signature.

EARL P. WEBSTER.

March 22, 1927.

1,621,866

G. M. ANDERSON

METHOD OF MARKING SHREDDED WHEAT BISCUIT

Original Filed May 17, 1918

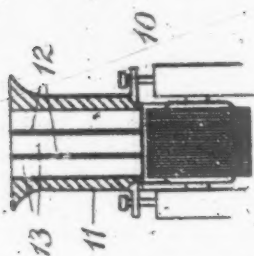


Fig. 2.

Fig. 1

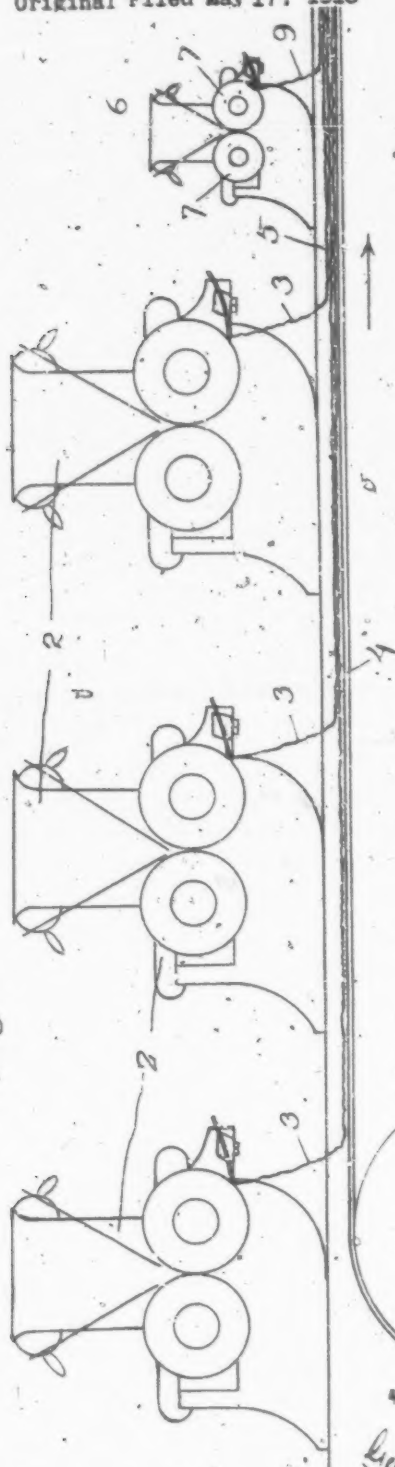
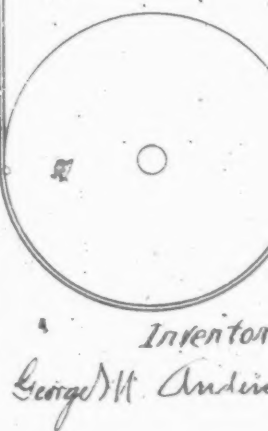


Fig. 3.



Inventor
George M. Anderson

Patented Mar. 22, 1927.

UNITED STATES PATENT OFFICE.

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SHREDDED WHEAT COMPANY, A CORPORATION OF NEW YORK

METHOD OF MARKING SHREDDED WHEAT BISCUIT.

Application filed May 17, 1916, Serial No. 235,144. Renewed August 3, 1924.

Figure 1 is a diagrammatic view of a means for carrying out the invention.

Figure 2 is a perspective view of the product.

Figure 3 is a diagrammatic sectional view of a shredding machine, showing a modified means for carrying out the invention.

The invention has relation to a method of superficially marking shredded wheat biscuit, with the idea of distinguishing the product, or to denote origin of the biscuit, and it consists in the novel construction and combinations of parts, as set forth in the appended claim.

In the accompanying drawings, illustrating a preferred means for carrying out the invention, the numeral 2 designates a gang of shredding machines, laying down bands 3 of cereal material upon a moving carrier 4 or belt 4, the band 5, made up of the several superposed layers, being of the thickness of the biscuit, and suitably divided or cut transversely into biscuit form all as disclosed in the prior art, for instance in the patents to H. D. Perky, 681,656, dated August 27, 1901, for continuous cutting machine, and F. Regnier, No. 1,027,762, dated May 28, 1912, for grain shredding machine.

At one end of the gang of shredding machines a shredding machine 6 is provided, shown as of smaller size than the machines 2, and the rollers 7 of which are of the usual character.

The narrow band of shredded material 9, laid down from the machine 6 upon the top of the composite band 5 for the biscuit proper, is designed to be of the thickness of one shred only, and will not materially or appreciably increase the thickness of the biscuit, which can be packed as usual, with no appreciable increase in weight.

This narrow band 9 of shredded material is suitably colored, for instance by chocolate

or annatto, mixed with the grain fed to the hopper of the shredding machine 6, and will be easily recognized, contrasting with the color of the top of the biscuit, and the edibility of the biscuit being in no way impaired thereby. This transverse band 9 appears as a hump or projection embossed or in relief upon the top of the biscuit.

A modification of the invention consists in providing a biscuit the top layer of which is of the usual dimensions, but particolored, having one transverse portion, as the central portion thereof, suitably colored before being laid down as stated, and the balance, or the transverse side portions, of natural color, the advantage being that a shredding machine having rolls of full size may be employed, and further in that the resulting product will be of the customary form, having no unusual protuberances or projections upon its top surface.

A means for carrying out this modification involves the use at one end of the gang of shredding machines of a shredding machine 10, the hopper 11 of which is divided by suitable partitions 12 into two or more chambers 13, into one of which grain suitably colored is fed, and into the other or others of which grain of natural color is fed.

I claim:

A method of making and simultaneously distinctively marking shredded cereal biscuit, consisting in laying down superposed bands of shredded cereal to form a composite band of the proper thickness, treating cereal material with a coloring agent and laying down from the same a distinctively colored top band upon said composite band and finally dividing the composite band and said top band transversely to form biscuit.

In testimony whereof I affix my signature.

GEORGE M. ANDERSON.

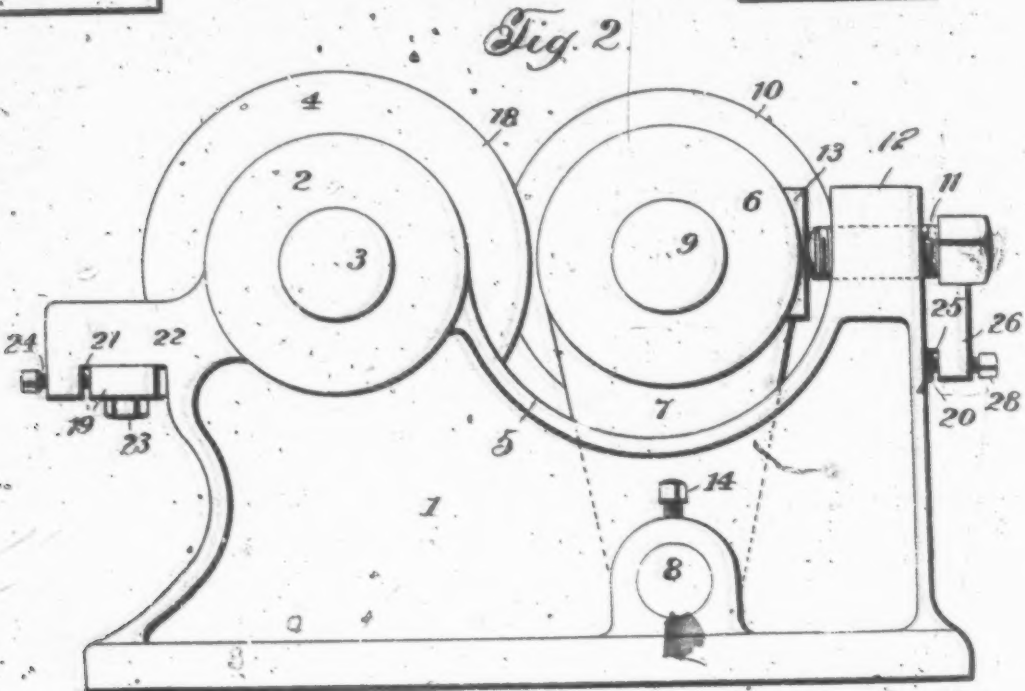
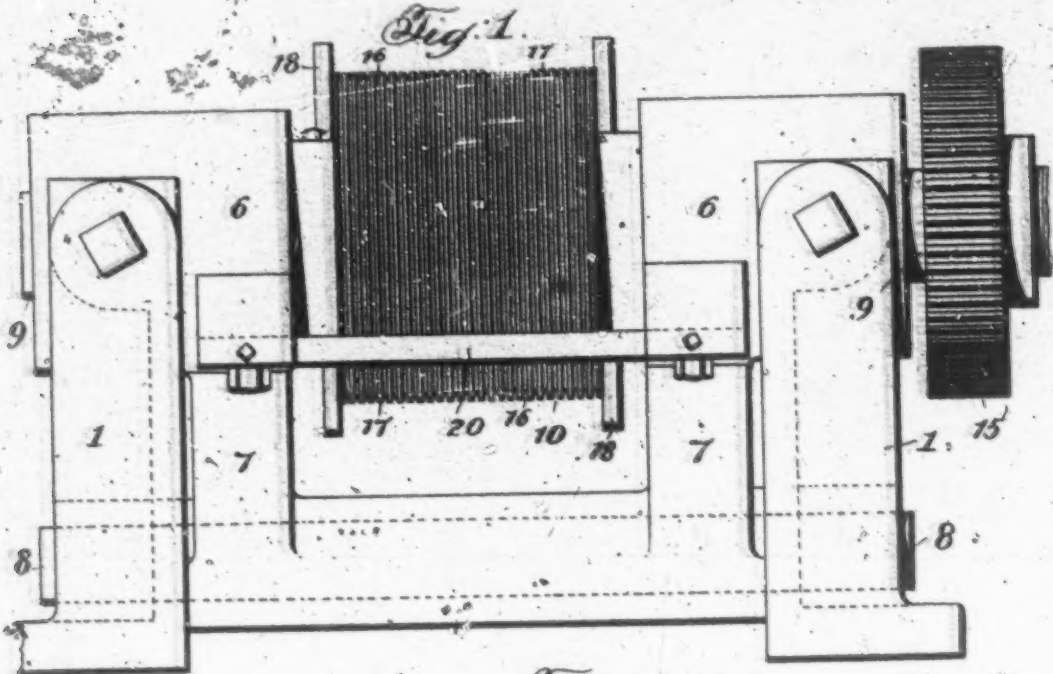
DEFENDANT'S EXHIBIT NO. 243.

(United States Patent.)

No.	PAGE
831,909, to R. E. Valentiné, Dated September 25, 1906	.. 319

R. E. VALENTINE.
MACHINE FOR PREPARATION OF CEREALS.
APPLICATION FILED JUNE 23, 1905.

3 SHEETS—SHEET 1.



Witnesses:

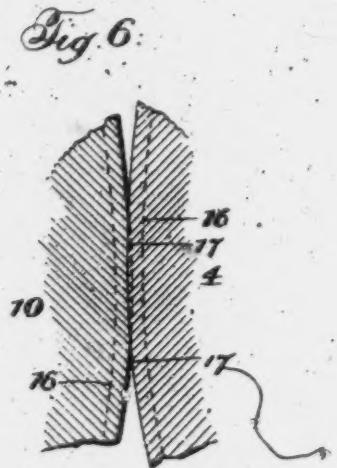
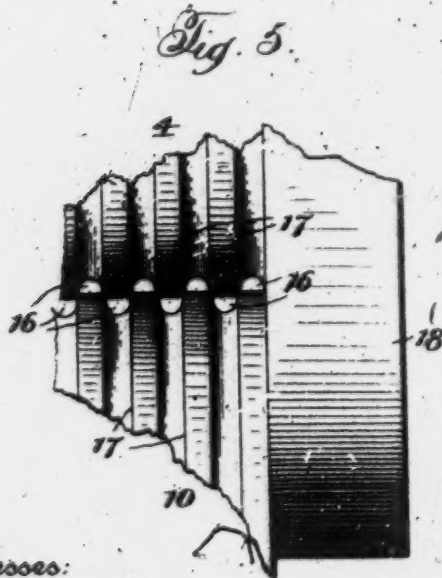
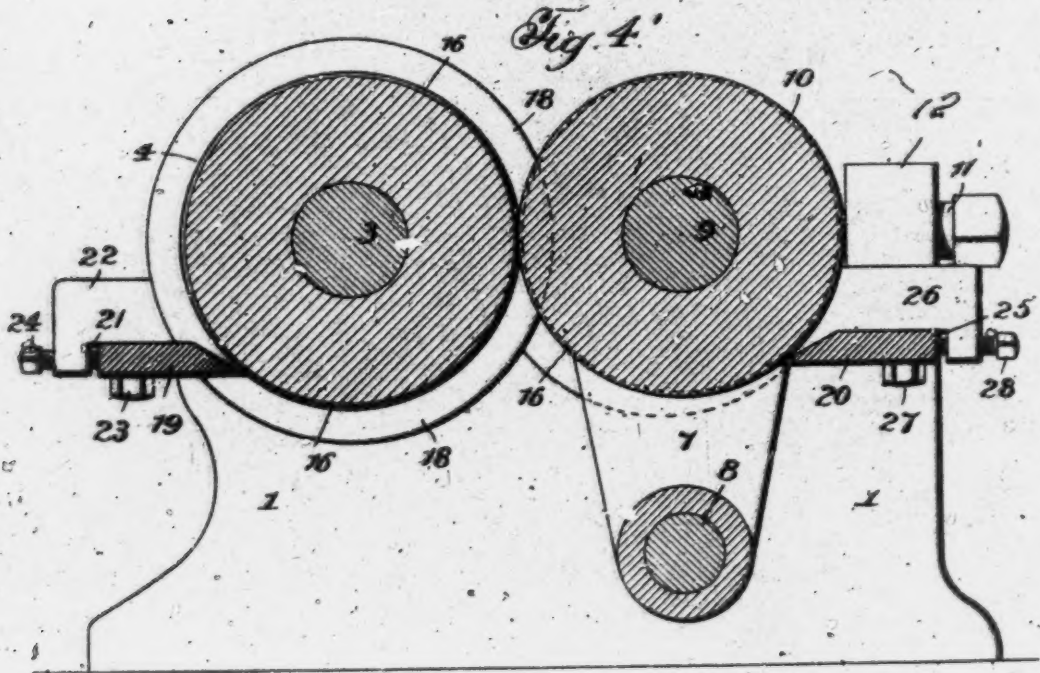
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Inventor:

Ralph E Valentine
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R. E. VALENTINE.
MACHINE FOR PREPARATION OF CEREALS.
APPLICATION FILED JUNE 22, 1905.

3 SHEETS—SHEET 3.



Witnesses:
Jas. E. Hutchinson.
J. W. Fitter.

Inventor:
Ralph E. Valentine.
by E. A. Russell Attorney.

UNITED STATES PATENT OFFICE.

RALPH E. VALENTINE, OF WORCESTER, MASSACHUSETTS.

MACHINE FOR PREPARATION OF CEREALS.

No. 831,906.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed June 23, 1905. Serial No. 367,592.

To all whom it may concern:

Be it known that I, RALPH E. VALENTINE, citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Machines for the Preparation of Cereals; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in machines for the preparation of cereals, and is more especially related to machines of that type designed for shredding the cereals.

The main and primary object of the present invention is to provide a machine of the character referred to the construction of which shall be much more effectual in reducing the cereals to a shredded state than the machines now commonly employed, one whereby the capacity of the machine shall be increased, and one wherein the shredding-rolls may be quickly and easily adjusted in their operative relation to compensate for wear, and to also regulate the character of the output of the machine.

The invention further contemplates the provision of a novel form of shredding-rolls designed to effect a saving in the cereals operated upon, thus enabling the machine to be used with the highest degree of economy and with but a minimum loss of the cereals.

Having these general objects in view and others, which will appear as the nature of the improvements is better understood, the invention consists, substantially, in the novel construction, combination, and arrangement of parts, as will be hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the appended claims.

In the drawings, Figure 1 is an end elevation of a machine constructed in accordance with and embodying the herein-described invention. Fig. 2 is a side elevation thereof. Fig. 3 is a top plan view of the machine. Fig. 4 is a longitudinal sectional view on the line 4-4, Fig. 3. Fig. 5 is a fragmentary plan view, on an enlarged scale, of the shredding-rolls. Fig. 6 is a transverse sectional view of one of said rolls.

Referring in detail to the drawings, the numeral 1 designates the supporting-standards of the herein-described machine, which standards may be arranged upon any suitable sup-

porting-base to give solidity to the machine, and said standards may also be formed of any suitable material adapted for the purpose. Adjacent one end of each of the standards 1 is a bearing 2, in which is journaled a shaft 3, and said shaft carries a roll 4 for acting upon the cereal to be treated. By reason of the bearings 2 being formed as a part of the standards 1 it will be seen that the roll 4 is stationary and immovable except by rotation in relation to said standards. The ends of the standards 1 opposite to the bearings 2 are recessed, as at 5, and arranged in said recesses is a pair of bearings 6, which bearings are formed upon a substantially U-shaped support 7, the lower end of which receives a fixed shaft 8, arranged in the lower portions of the standards 1, and upon which shaft the support 7 is adapted to swing, and thereby enable the bearings 6 to approach or recede from the bearings 2. It will also be seen that the bearings 6 are not connected to the standards 1 except through the medium of the shaft 8, and hence said bearings are freely movable for a purpose to be presently stated.

Mounted in the bearings 6 is a shaft 9, which shaft carries a roll 10, which cooperates with the roll 4 for reducing the cereal, and it will therefore be seen that the roll 10 lies in parallelism with the roll 4 and that the edges of said rolls will contact for effectually reducing the cereals fed thereto. The degree of contact of the roll 10 with the roll 4 may be varied in accordance with the character of the cereal operated upon and also in accordance with the character of the output of the machine. To vary the degree of contact, the roll 10 is swung toward or away from the roll 4, and for effecting this adjustment of the roll 10 a pair of adjusting-screws 11 is arranged at the end of the machine contiguous to the bearings 6, said screws being mounted in threaded bosses 12 and having their inner ends impinging against contact-faces 13, formed upon the outer sides of the bearings 6. Upon proper rotation of the screws 11 the same will force the bearings 6 toward the bearings 2, thus bringing the contiguous faces of the rolls 10 and 4 into closer relationship with each other, and by reversely rotating the screws 11 the space between said rolls may be increased. For locking the shaft 8 in fixed position within the standards 1 a set-screw 14 or its equivalent may be employed.

The shaft 3 of the roll 4 is preferably elongated to provide for the application of power

for driving the machine, and mounted upon said shaft and the shaft of the roll 10 is a pair of intermeshing gears 15, whereby motion is communicated from the shaft 3 to the shaft 9 and the rolls 4 and 10 rotated in opposite directions. It will of course be understood that the direction of rotation of the rolls is such that the cereals fed upon the top thereof and opposite to the meeting edges of the rolls will be drawn inwardly between the latter for action thereon by the meeting faces of the rolls.

As before premised, it is one of the objects of the present invention to provide a novel form of shredding-rolls, whereby it is possible to effect saving in the cereals operated upon, and thus enable the machine to be used with the highest degree of economy and with but a minimum loss of the cereals. Referring, therefore, to Figs. 5 and 6, the construction of the shredding-rolls will be very clearly seen, and it will be noted that each of these rolls is provided with a series of circumferential grooves 16 and that between the grooves of the respective rolls a series of plain surfaces or projecting ribs 17 is formed. The ribs 17 alternate with the grooves 16; but the relation of the respective rolls to each other is such that the ribs 17 of each fit within the grooves 16 of the other. It will also be noted that the bottoms of the grooves are shown as substantially semicircular. This is but a preferred form, however, and any configuration desired may be given to the bottoms of the grooves; but it is requisite that the extreme outer edges of the sides of the grooves shall be perfectly straight and at right angles to the axes of the rolls for a slight distance below the face of the projecting ribs 17 and that the width of the grooves must always equal the width of the projecting ribs or be slightly greater than such width. The purpose of this construction is to enable the projecting ribs 17 to enter to a slight extent the grooves 16, whereby the shredding is effected by a shearing or cutting action rather than by crushing or mashing. The interfitting of the ribs of the respective rolls doubles the capacity of the rolls and also decreases the power required for operating the same.

In order to prevent loss of the cereals, one of the rolls, preferably the roll 4, is provided at each of its ends with an annular flange 18, the diameter of said flanges being greater than the diameter of the roll, and consequently when the rolls 4 and 10 are in operative relation the latter roll fits between the flanges 18, which act as guides for the rolls and effectually prevent the diverting of the cereals at the ends of the rolls. To strip the cereal from the faces of the rolls after the same has passed between the latter, a pair of scrapers 19 and 20 is employed. The scraper 19 is arranged in recesses 21, formed at the under side of outwardly-projecting lugs 22, which lugs are formed upon the ends of the

standards 1 adjacent to the bearings 2, the scraper 19 being held in position through the medium of bolts 23 or their equivalent, which bolts have a slotted connection with the scraper 19, and in order to adjust the position of the latter to vary the position of the teeth thereof in relation to the grooves of the roll 4 a pair of adjusting-screws 24 is employed, said screws being threaded in the free ends of the lugs 22 and bearing against the outer edge of the scraper 19. The scraper 20 is arranged in notches 25, formed at the under side of outwardly-projecting lugs 26, which lugs are carried by the bearings 6, said scraper being held in position within the notches 25 through the medium of bolts 27, having a slotted connection with the lugs 26, and by reason of the lugs 26 being carried by the bearings 6 it is obvious that the position of the scraper 20 in relation to the roll 10 will always remain the same, irrespective of the adjustment of said roll relative to the roll 4. To adjust the position of the scraper 20 in relation to the roll 10, adjusting-screws 28 are employed, said screws being threaded in the outer ends of the lugs 26 and impinging against the scraper 20. The adjustment of the scraper through the medium of these screws is obvious.

In the operation of the herein-described machine the cereal after being properly prepared by boiling, steaming, or soaking and brought to the proper constituency, which latter is determined by the results at the machine, is fed into the rolls through the medium of a tube or hopper or by any other suitable form of feeding device. The rolls 4 and 10, rotating toward each other, receive the cereals so fed, and by reason of their upper surfaces converging it is obvious that the cereal will pass in between the rolls. In the passage of the cereal the same is pressed into the grooves of the respective rolls, where it is formed into filaments, and in such form the cereal is delivered from the rolls. These filaments will be formed and delivered continuously, as the kernels of the grain will adhere to each other, and they are acted upon by the pressure due to the convergence of the roll-surfaces. The flanges 18 effectually act as guides for the rolls, so that there is no loss of cereal at the ends of the rolls. In the passage of the cereal through the rolls the ribs 17 shear or cut the same in contradistinction to crushing or mashing the cereal, and consequently but a minimum of power is required for operating the rolls. After leaving the rolls the product may be taken up by any suitable form of conveyer or deposited in suitable receptacles for the purpose. The roll 10 may be readily adjusted toward or away from the roll 4, thus decreasing or increasing the space in said rolls, which adjustment is effected by varying the position of the swinging support 7.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In a machine for preparing cereals, a frame, a stationary roll mounted in said frame, a scraper carried by the frame and co-operating with the stationary roll to strip the cereal therefrom, a support pivoted in the frame, a roll journaled in said support and co-operating with the fixed roll, a scraper carried by said support and co-operating with the movable roll to strip the cereal therefrom, and means for adjusting the position of the movable roll relatively to the stationary roll.

2. In a machine for preparing cereals, a frame, a stationary roll mounted in said frame, a scraper carried by the frame and co-operating with the stationary roll to strip the cereal therefrom, a support pivoted in the frame, a roll journaled in said support and co-operating with the fixed roll, a scraper carried by said support and co-operating with the movable roll to strip the cereal therefrom, and screws carried by the frame for adjusting the position of the movable roll relatively to the stationary roll.

3. In a machine for preparing cereals, a frame, a roll mounted in stationary bearings in said frame, outwardly-projecting lugs carried by the frame, a scraper carried by said lugs and co-operating with said roll to strip the cereal therefrom, means for adjusting the scraper on said lugs relatively to said roll, a support pivoted in the frame, a roll journaled in said support and co-operating with the first-mentioned roll, outwardly-projecting lugs carried by said support, a scraper carried by said lugs and co-operating with the movable roll to strip the cereal therefrom, and means for adjusting the position of the movable roll relatively to the stationary roll.

4. In a machine for preparing cereals, a frame, a roll mounted in stationary bearings in said frame, outwardly-projecting lugs carried by the frame, a scraper carried by said lugs and co-operating with said roll to strip the cereal therefrom, screws carried by said lugs for adjusting the scraper thereon relatively to said roll, a support pivoted in the frame, a roll journaled in said support and co-operating with the first-mentioned roll, outwardly-projecting lugs carried by said support, a scraper carried by said lugs and co-operating with the movable roll to strip the cereal therefrom, and screws carried by said lugs for adjusting the scraper thereon relatively to said movable roll.

5. In a machine for preparing cereals, a frame, a roll mounted in stationary bearings in said frame, outwardly-projecting lugs carried by the frame, a scraper carried by said lugs and co-operating with said roll to strip the cereal therefrom, screws carried by said lugs for adjusting the scraper thereon relatively to said roll, a support pivoted in the frame, a roll journaled in said support and co-operating with the first-mentioned roll, outwardly-projecting lugs carried by said support, a scraper carried by said lugs and co-operating with the movable roll to strip the cereal therefrom, screws carried by said lugs for adjusting the scraper thereon relatively to said movable roll, and means for adjusting the position of the movable roll relatively to the stationary roll.

In testimony whereof I affix my signature in the presence of two witnesses.

RALPH E. VALENTINE.

Witnesses:

HENRY E. COOPER,
FANNIE R. FITTON.

DEFENDANT'S EXHIBIT NO. 244.

Book of Patents Issued to Defendant.

(United States Patents.)

No.	PAGE
1,102,614, to R. E. Valentine, Dated July 7, 1914	331
1,159,045, to J. L. Kellogg, Dated November 2, 1915 (Spec- ification Only)	355
1,189,130, to J. L. Kellogg, Dated June 27, 1916 (Specifi- cation Only)	357
1,197,297, to J. L. Kellogg, Dated September 5, 1916 (Spec- ification Only)	359
1,783,434, to J. L. Kellogg, Dated December 2, 1930	361
1,091,509, to O. A. Hanford, Dated March 31, 1914	393
1,124,363, to R. E. Valentine, Dated January 12, 1915	411
1,143,151, to R. E. Valentine, Dated June 15, 1915	417

R. E. VALENTINE.
MACHINE FOR MAKING BISCUITS OF SHREDDED CEREAL.
APPLICATION FILED JAN. 12, 1914.

1,102,614.

Patented July 7, 1914

7 SHEETS-SHEET 2.

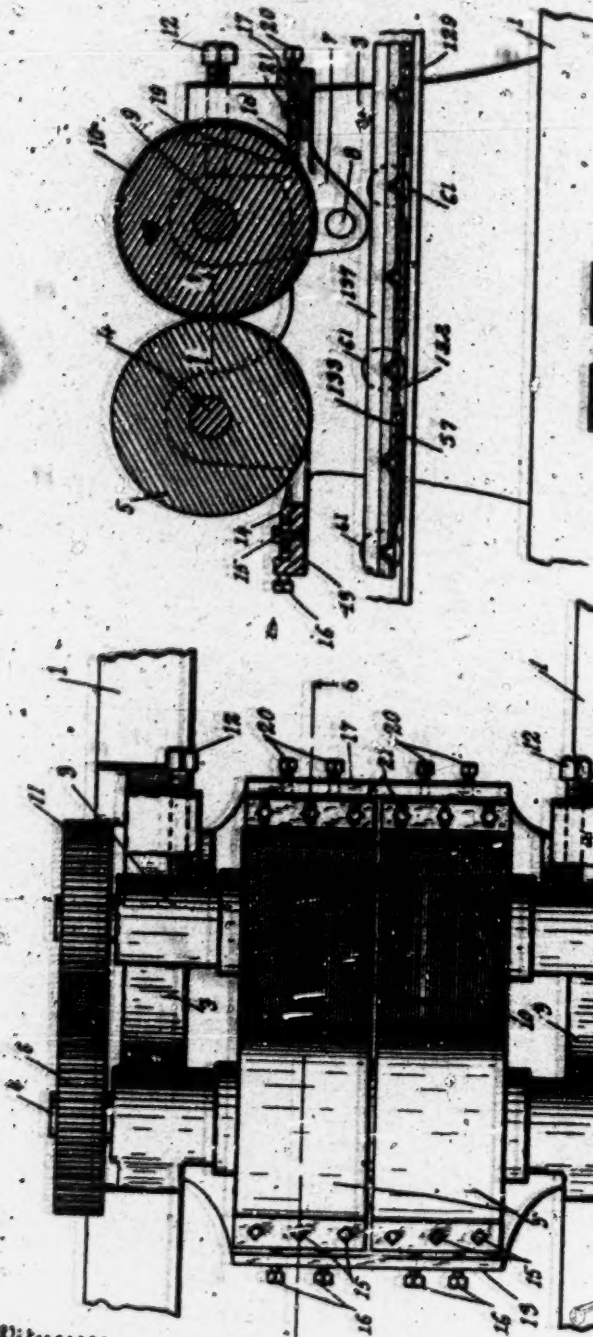


Fig. I.

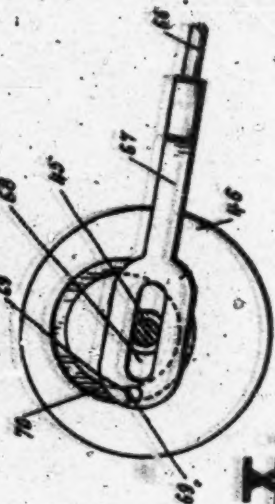


Fig. II.



Fig. III.
Fig. IV.
Fig. V.
Fig. VI.
Fig. VII.
Fig. VIII.
Fig. IX.
Fig. X.
Fig. XI.
Fig. XII.
Fig. XIII.
Fig. XIV.
Fig. XV.
Fig. XVI.
Fig. XVII.
Fig. XVIII.
Fig. XIX.
Fig. XX.
Fig. XXI.
Fig. XXII.
Fig. XXIII.
Fig. XXIV.
Fig. XXV.
Fig. XXVI.
Fig. XXVII.
Fig. XXVIII.
Fig. XXIX.
Fig. XXX.

Witnesses
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R. E. VALENTINE.
MACHINE FOR MAKING BISCUITS OF SHREDDED CEREAL.
APPLICATION FILED JAN. 12, 1914.

1,102,614.

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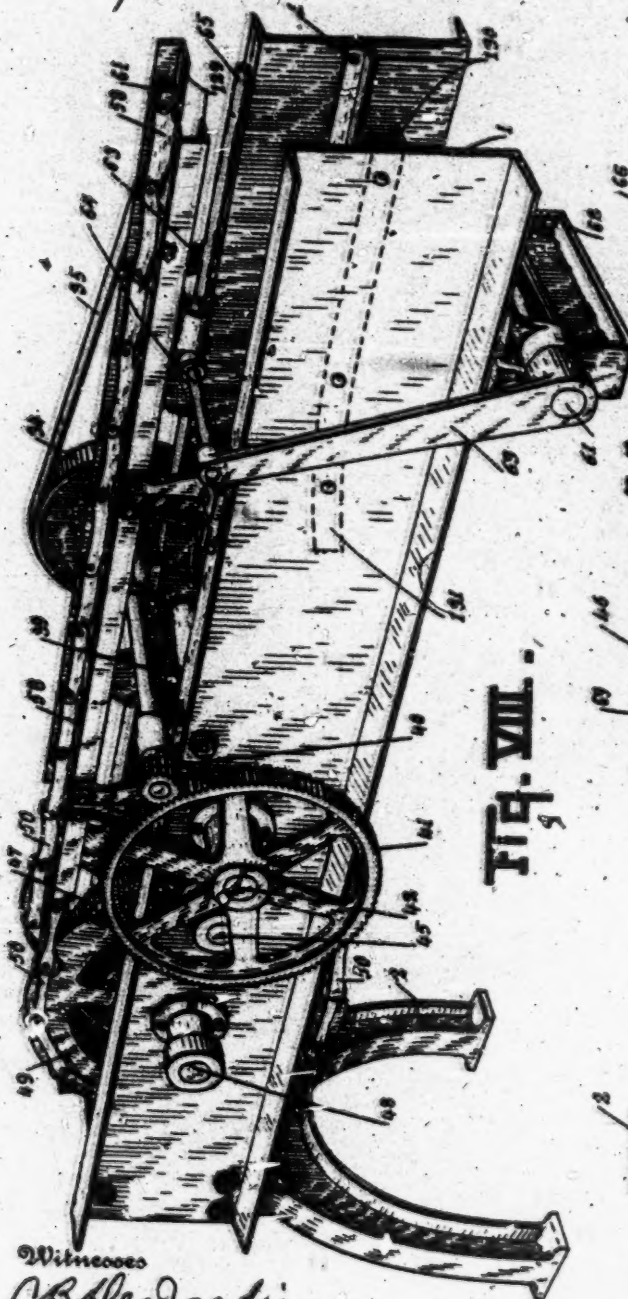


FIG. VII.

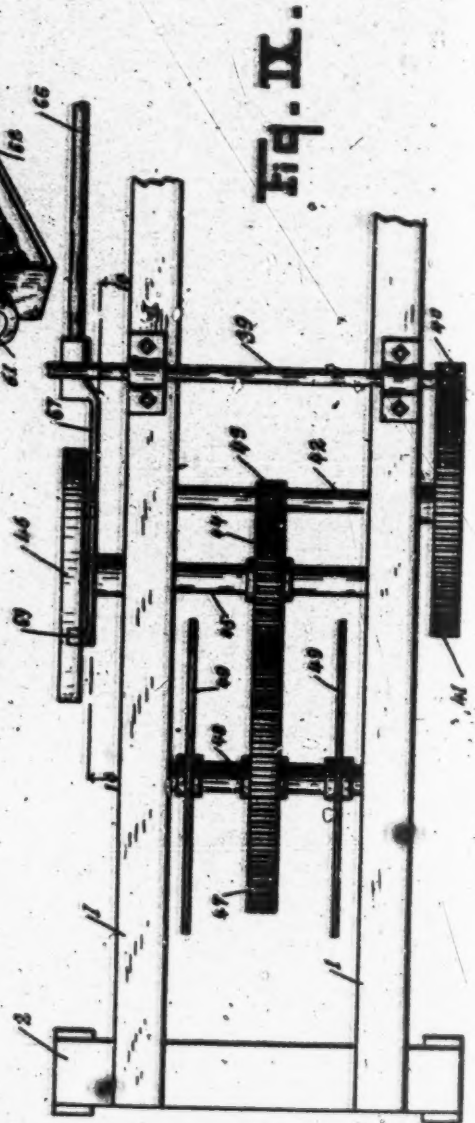


FIG. IX.

Witnesses
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R. E. VALENTINE.
MACHINE FOR MAKING BISCUITS OF SHREDDED CEREAL.
APPLICATION FILED JAN. 12, 1914.

1,102,614.

Patented July 7, 1914.

7 SHEETS-SHEET 4.

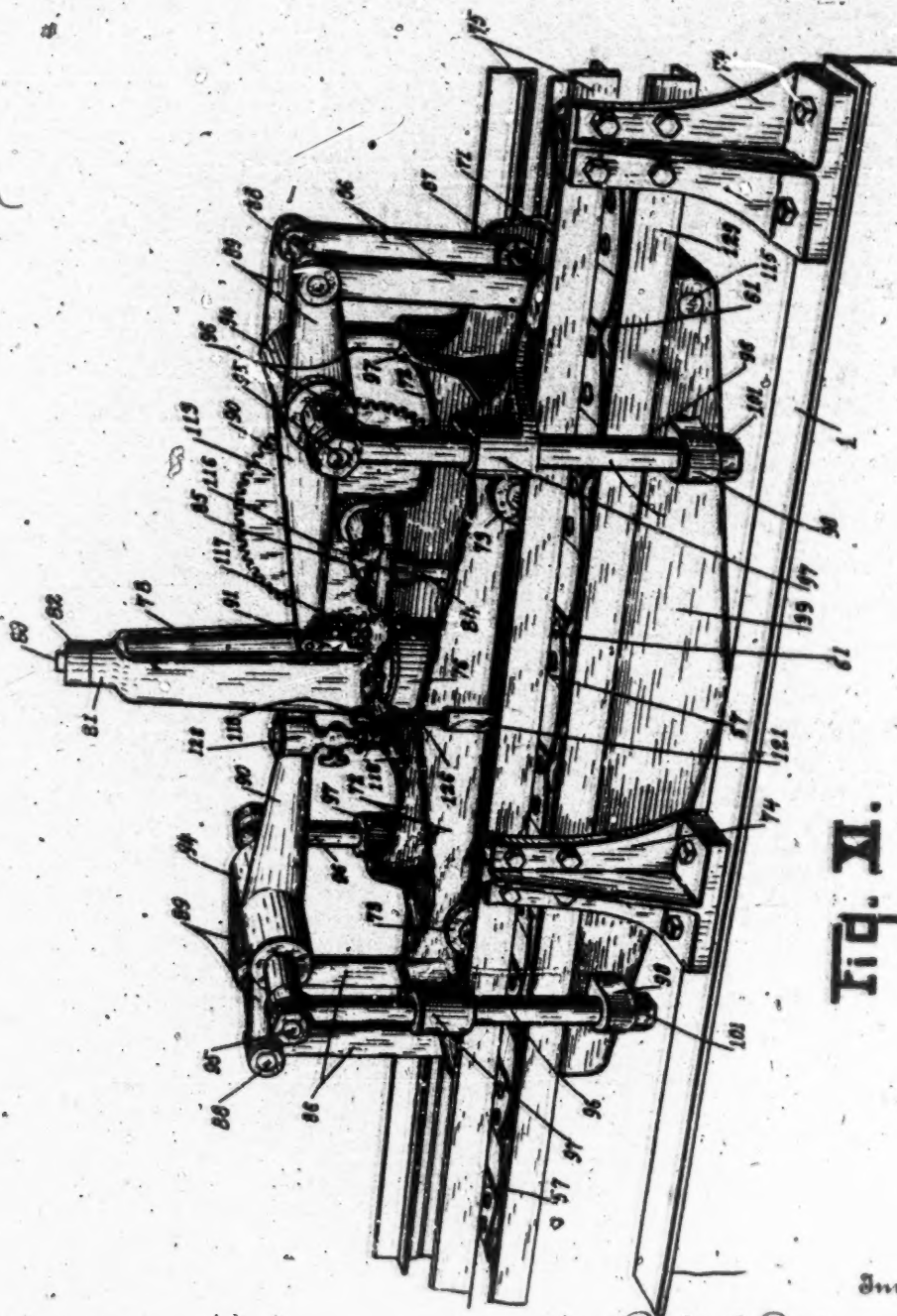


Fig. 1.

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Witnesses

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384

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MACHINE FOR MAKING BISCUITS OF SHREDDED CEREAL.
APPLICATION FILED JAN. 12, 1914.

1,102,614.

Patented July 7, 1914

7 SHEETS-SHEET 5.

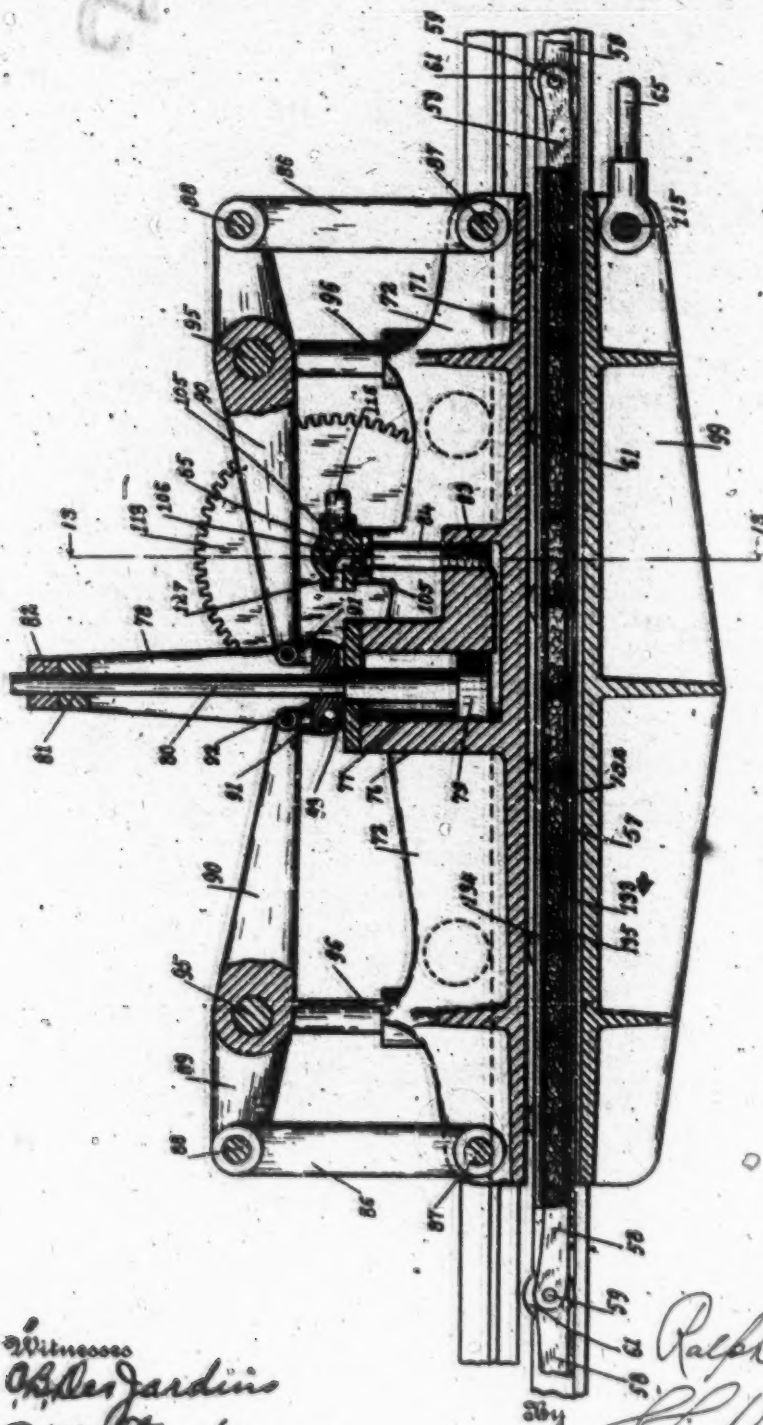


Fig. 5.

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R. E. VALENTINE.
MACHINE FOR MAKING BISCUITS OF SHREDDED-CEREAL.
APPLICATION FILED JAN. 12, 1914.

1,102,614.

Patented July 7, 1914.

7 SHEETS-SHEET 6.

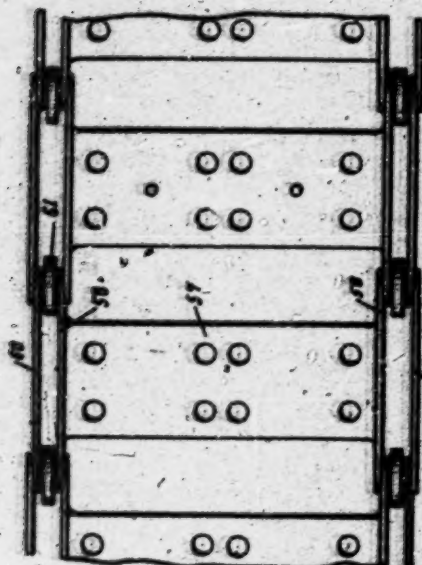


Fig. XVI.

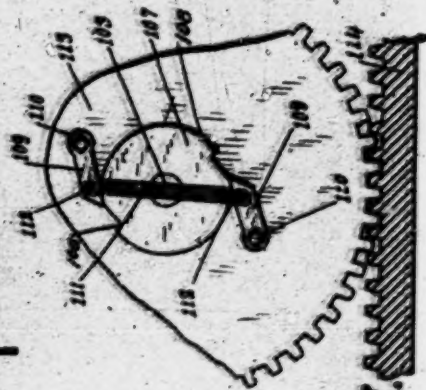


Fig. XVII.

Fig. XV.

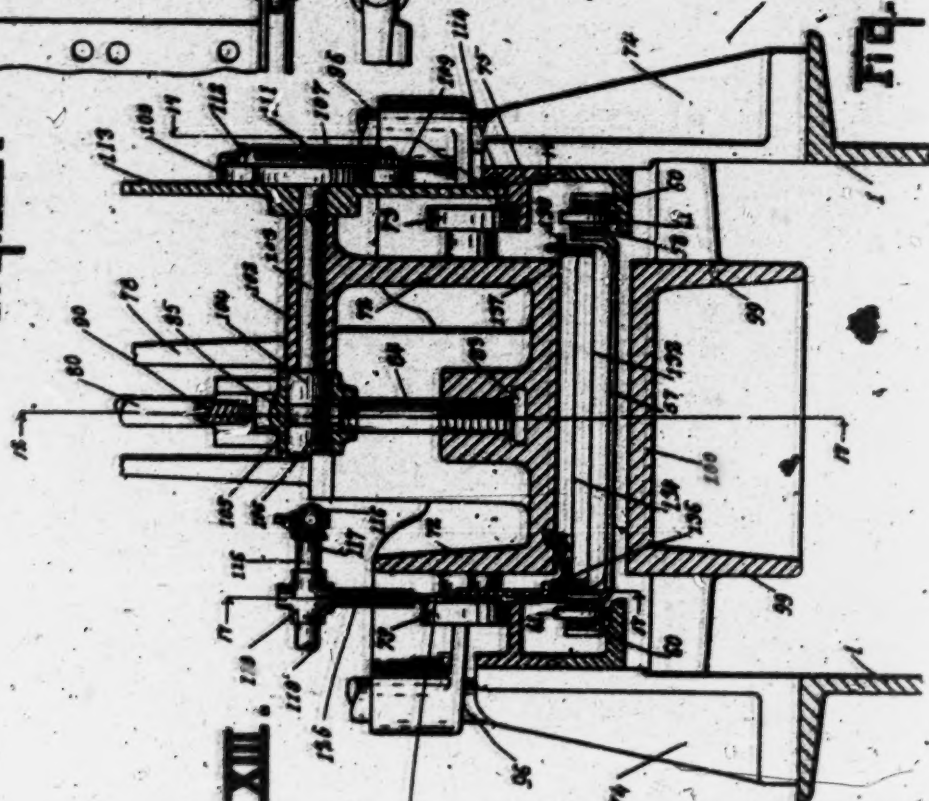


Fig. XIII.

Witnesses
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G. B. Thompson

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Attorney



R. E. VALENTINE.

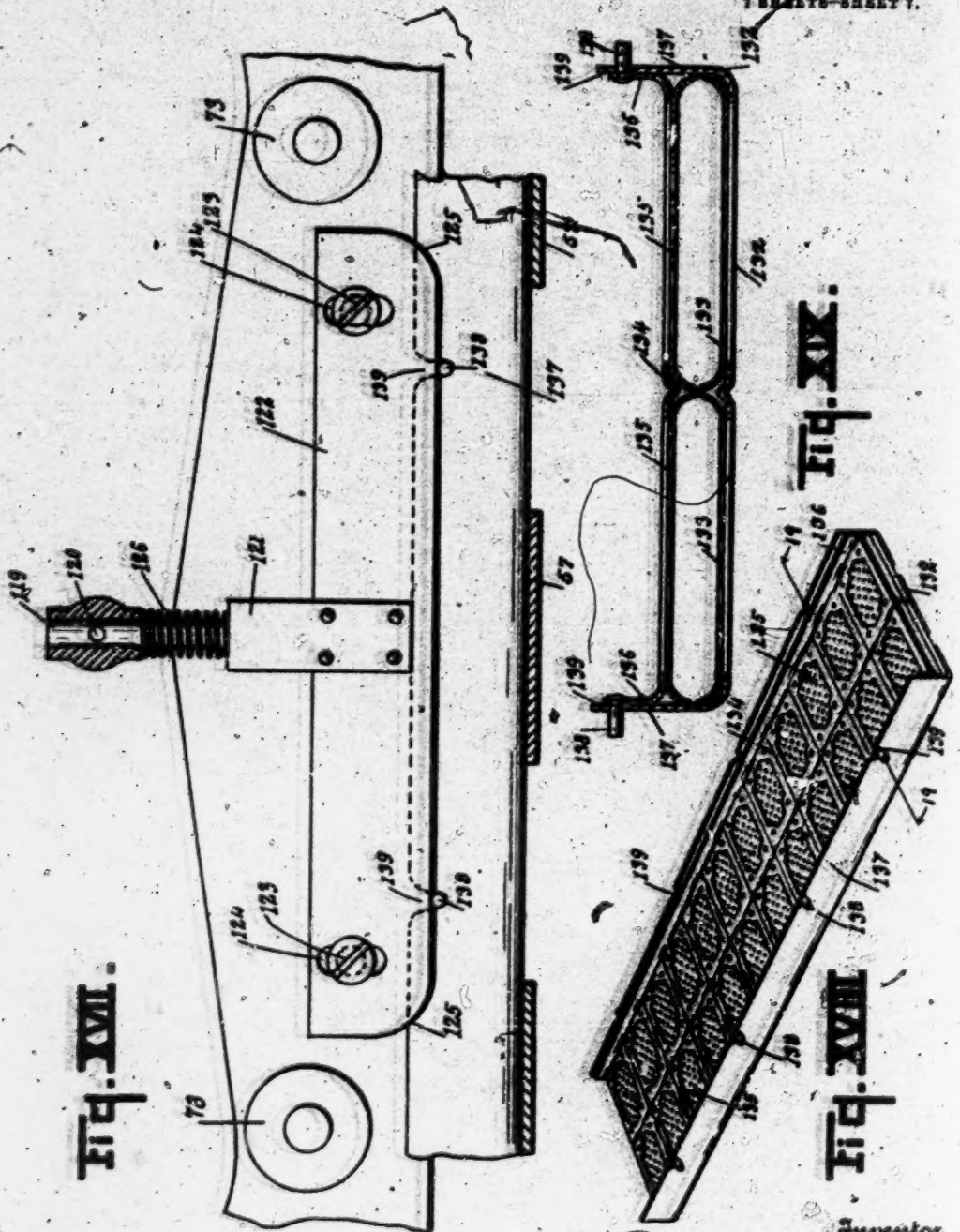
MACHINE FOR MAKING BISQUITS OF SHREDDED CEREAL.

APPLICATION FILED JAN. 12, 1914.

1,102,614.

Patented July 7, 1914

7 SHEETS-SHEET 7.



Witnesses
Chas. Jardine
G. B. Thompson

Ralph E. Valentine
Charles Earl

UNITED STATES PATENT OFFICE.

RALPH E. VALENTINE, OF BATTLE CREEK, MICHIGAN, ASSIGNOR TO KELLOGG TOASTED CORN FLAKE CO., OF BATTLE CREEK, MICHIGAN.

MACHINE FOR MAKING BISCUITS OF SHREDDED CEREAL.

1,102,614.

Specification of Letters Patent.

Patented July 7, 1914.

Application filed January 12, 1914. Serial No. 811,009.

To all whom it may concern:

Be it known that I, RALPH E. VALENTINE, a citizen of the United States, residing at Battle Creek, Michigan, have invented certain new and useful Improvements in Machines for Making Biscuit of Shredded Cereal, of which the following is a specification.

This invention relates to a new and improved machine for making biscuit of shredded cereal.

The objects of this invention are: First, to provide a machine for making shredded cereal biscuit which delivers layers of the shredded material to the baking pans and molds, and forces the covers thereon. Second, to provide in such a machine an improved automatic device for forcing the covers on the baking pans. Third, to provide in a machine of the type described, improved means for molding the biscuits whereby they are formed without waste. Fourth, to provide in a machine of the type described, means for preventing the operation of the molding means, when the pans and molds passing through the machine are not properly covered.

Further objects, and objects relating to details and economies of construction and operation will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure which is a preferred embodiment of my invention is clearly illustrated in the accompanying drawing forming a part of this specification, in which:

Figure I is a side elevation of the machine, parts thereof being broken away. Fig. II is a sectional view on the line 2—2 of Fig. I, showing in detail one set of the shredding rolls and its connection with the motor. Fig. III is a sectional view on the line 3—3 of Fig. II, showing in detail the connection of a set of shredding rolls with the motor. Fig. IV is a sectional view on the line 4—4 of Fig. III. Fig. V is a top plan view of a set of shredding rolls, the chutes delivering to said rolls being omitted. Fig. VI is a sectional view on lines 6—6 of

Figs. II and V, showing the shredding rolls in further detail. Fig. VII is a sectional view on the line 7—7 of Fig. VI, showing the engagement of the smooth and grooved rolls in detail. Fig. VII^A is a sectional view showing both rolls grooved in accordance with the modified form illustrated in my Patent No. 831,909, of September 23, 1906, the same being sectional on line corresponding to the view of Fig. VII. Fig. VIII is a perspective view of the rear end of the machine. Fig. IX is a top plan view of the rear of the machine, the conveying belt and the guide track therefor being omitted. Fig. X is a sectional view on the line 10—10 of Fig. IX, showing in detail the cam wheel actuating the pitman rod. Fig. XI is a perspective view of the pneumatic device for forcing the covers on the baking pans. Fig. XII is a longitudinal sectional view through said pneumatic device taken on the line 12—12 of Fig. XIII. Fig. XIII is a transverse sectional view taken on the line 13—13 of Fig. XII. Fig. XIV is a sectional view on the line 14—14 of Fig. XIII, showing in detail the connection of the valve operating shaft. Fig. XV is a top plan view of a portion of the conveying belt. Fig. XVI is a view in side elevation of a portion of said belt. Fig. XVII is a sectional view on the line 17—17 of Fig. XIII, showing in detail the slide valve controlling the compressed air supply and the means for operating the same. Fig. XVIII is a perspective view of a baking pan and molds with the cover applied thereto. Fig. XIX is a sectional view through said baking pan on the line 19—19 of Fig. XVIII.

In the drawing, similar reference characters refer to similar parts throughout the several views and the sectional views are taken looking in the direction of the little arrows at the ends of the section lines.

Considering the numbered parts of the drawing, 1—1 are the frame members, which are supported on the base members 2—2 provided at suitable intervals. The machine is provided with a number of sets of shredding rolls, and as each set of rolls is identical, a description of one will suffice.

3—3 are supporting members secured to the top of the frame members 1—1, and having journaled therein the shaft 4 to

which the smooth roll 5 is secured. Gear 6 is secured on the outer end of the shaft 4. Links 7 are pivoted at 8 to the supporting members 3-3, and the shaft 9 is journaled in the upper ends of said links, and has secured thereto the grooved roll 10 which has a plurality of grooves 10', as shown in Fig. VII. Shaft 9 carries on its outer end the gear 11 which is in mesh with the gear 6. Set screws 12 are threaded into the upper part of the supporting members 3 and engage the tops of links 7 so as to regulate the engagement of the smooth and grooved rolls. Bracket 13 is secured to the supporting members 3 and carries the scraper 14 engaging the smooth roll 5, and held in adjusted position by means of the set screw 15. Set screw 16 is mounted in the upturned outer end of the bracket 14 and serves to regulate the engagement of the scraper with the smooth roll 5. The links 7 are provided with a similar bracket 17 carrying a scraper provided with a plurality of teeth 18 engaging in the grooves of the roll 10. This scraper is adjusted relative to the rolls by means of the set screw 20 carried by the outer upturned end of the bracket 17 and the scraper is held in adjusted position by means of the set screw 21.

To the inner end of the shaft 9 is secured the gear 22 which is in mesh with a gear 23, splined to the shaft 24, which is journaled in the supporting members 3. On the inner end of shaft 24 is mounted the gear 25 which is in mesh with a gear 26 driven by a motor 27. A disk 28 is splined to the inner end of the shaft 24 and carries a pin 29 engaging in the slot 30 in the gear 25. The motor 27 rests on a bracket 31, supported by the frame member 1 and a standard 32.

The material, preferably prepared in accordance with the process set forth in the application of John L. Kellogg, Serial No. 720,471, filed September 16, 1912, is fed to the shredding rolls through the chutes 23.

39 is a shaft suitably journaled on the frame members 1 and carries on its inner end the pulley 34 which is connected by the belt 35 with a motor 36, resting on a bracket 37, supported by the standard 38 and the frame 1. Shaft 39 carries on its outer end the gear 40 in mesh with the gear 41 on shaft 42, which is suitably journaled in the frame members. Gear 43 is secured to the center of shaft 42 and meshes with a gear 44 carried by shaft 45 which is also suitably journaled in the frame members 1. Shaft 45 carries on its inner end the cam wheel 46. Gear 44 is in mesh with a gear 47 on shaft 48, which is journaled in the frame members 1, and carries the sprocket wheels 49.

On the front end of the machine are provided the sprocket wheels 51, carried on a shaft 52, having its ends journaled in blocks 53 which are disposed in grooved ways 54,

secured to the sides of the frame members 1. Adjusting screws 56 are disposed in lugs projecting from the frame members and engage the blocks 53. By this means the shaft 52 can be moved back and forth so as to regulate the tension on the carrying belt.

The conveying belt 50 passes over the sprocket wheels 51 and 49 and carries the pans and molds, to be filled with the shredded cereal, through the machine. This conveyer is made up of the cross members 57 provided at either end with the upstanding members 58 which are connected together by means of the pins 59. The outer ends of said pins are connected together by means of the links 60, and rollers 61 are journaled on said pins between the links 60 and the upstanding members 58, said rollers also serving to keep the links 60 spaced from the upstanding members 58.

Rock shaft 61 is journaled in a bearing 62 secured to the under side of the frame members 1, and upon the ends of this rock shaft are secured the lever arms 63. The upper ends of these lever arms are connected by means of a rod 64, to the center of which is adjustably secured the pitman rod 65. To the inner lever arm 63 the pitman 66 is connected. To the other end of the pitman rod 66 is secured the bar 67, provided with slot 68, through which the shaft 45 passes. The outer end of the bar 67 carries a pin 69 which engages in the cam slot 70 provided in the cam wheel 46. It will thus be seen, that for every revolution of the shaft 45 there is a complete reciprocation of the pitman 66, and this motion is multiplied and communicated to the pitman rod 65 by means of the lever arms 63. The pitman rod 65 is connected to the rear end of the pneumatic device, which I will now describe.

The device for pressing the covers on the baking pans comprises, the base plate 71, provided with the side members 72, on which are journaled the rollers 73 which run on the tracks 75, supported by the brackets 74 on the frame members 1. In the central part of the base plate is provided the housing 76 in which is the piston chamber 77. From the top of the housing 76 is supported the standard 78. The piston 79 moves in the piston chamber 77 and is provided with the piston rod 80, the upper end of which has a bearing 81 in the standard 78. A collar 82 is secured to the upper end of the piston rod to limit its downward movement. Housing 76 is also provided with an air passage 83 communicating with the bottom of the piston chamber and compressed air is supplied to said air passage through the pipe 84 and valve 85.

Links 86 are pivoted on the rods 87 secured at the ends of said base plate, and the upper ends of these links are pivoted on the rods 88 carried by the forked cutter

ends of the levers 90. The inner ends of these levers are connected by means of links 91 with a collar 92 fitting around the piston rod 80 and resting on a shoulder 93 thereon. The levers 90 are provided with bosses 94 through which pass the rods 95, to the outer ends of which the rods 96 are secured. Rods 96 pass through lugs 97 provided on the side members 72 of the base plate and through lugs 98 provided on the side members 99 of the presser plate 100. The presser plate is held in position by means of the nuts 101 on the threaded lower ends of said rods 96.

In a supporting bracket 102, which is integral with one of the side members 72, is journaled a shaft 103 which carries on its inner end the turning plug 104 in the valve 85. This turning plug is provided with a pair of oppositely disposed slots 105, forming the narrowed portion 106 of said turning plug, which serves to open and close the valve 85. On the outer end of said shaft 103 is secured the ratchet wheel 107, provided with the teeth 108. Pawls 109 are pivoted at 110 to the gear 113 which is journaled on the shaft 103. These pawls 109 engage the ratchet teeth 108 and are held resiliently in engagement therewith by means of the spring 111 secured at its ends to the pins 112 on the pawls 109. Gear 113 is in mesh with a rack 114 provided on the outer track 75. As a result the gear 113 will be given a rotary motion as the pneumatic device is moved back and forth. Pitman rod 65 is connected to the presser plate 100 at 115.

Compressed air is admitted to the valve 85 through the pipe 116, which is provided with a pet cock 117, and is connected with the main supply pipe 118' by the slide valve 118. The slide valve is provided with a valve rod 119 provided with a port 120 therethrough, through which the compressed air passes when said port is in alinement with the passage through the pipes 118' and 116. To the lower end of the valve rod 119 is secured the bar 121 which is fastened to the plate 122. Plate 122 is slidably connected to the side member 72 by means of screws 123 which pass through the slots 124 in plate 122. The ends of said plate are rounded at 125 so that they will ride up on the pin 138 carried by the covers of the baking pans. Spring 126 is interposed between the bar 121 and the base of the slide valve 118 and serves to hold the plate 122 normally down so that port 120 is out of alinement with the passage through the pipes 118' and 116. By this means the flow of compressed air is cut off except when the covered baking pans are passing through the machine.

127 is the exhaust head for permitting the escapement of air from the piston chamber 77.

128 is an oil cup provided on the supply pipe 118' for oiling the valves.

Tracks 129 are suitably supported from brackets on the frame members 1 and upon these tracks the rollers 61 of the conveyer 70 run as the conveyer passes through the machine. Tracks 130 are also provided, which are secured to the frame members 1 and upon which the rollers 61 of the conveyer travel as the belt is returning to front of the machine. The ends of these tracks are downwardly curved somewhat, as at 131, so that the conveyer will run upon them smoothly.

132 is a baking pan provided with the biscuit molds 133 secured thereto. 134 is the cover for said baking pan to which the molds are secured and which is provided with the upturned flanges 136 fitting snugly inside the upturned flanges 137 of the baking pan. The cover flanges are provided with pins 138 fitting in the notches 139 provided in the flanges of the pan. These pans are fully illustrated and described in my application, No. 673,214, filed January 24, 1912.

From the description of the parts given above the operation of this machine should be very readily understood. The material, which has preferably been prepared in accordance with the process set forth in the application of John L. Kellogg, No. 720,471, referred to above, is delivered by the chutes 33 to the shredding rolls 5 and 10. These rolls are geared to turn in opposite directions and act as squeeze rolls. Due to the grooved roll 10 the material is delivered from the rolls into the pans below, which are carried by the conveyer belt, in a shredded condition. Each set of shredding rolls delivers a layer of shredded material into the baking pan, and as many sets of rolls can be provided as desired, depending upon the number of layers of shreds which it is desired to incorporate into the biscuit. Each set of shredding rolls is driven by a separate electric motor. The scrapers 14 and 18 serve to keep the rolls clean. The baking pans are placed upon the conveyer before it reaches the first set of shredding rolls. After the pans carried by the conveyer leave the last set of shredding rolls, covers are placed thereon with the pins 138 engaging in the notches 139 of the pans. The sprocket wheels which move the conveyer are driven by the motor 36 which is connected to the pulley 34, the latter being connected by a train of gears with the sprocket wheels 49. The train of gears also serves to drive the shaft 45 carrying the cam wheel 46 and, due to the engagement of the pin 69 in the cam slot 70 carried by said cam wheel, a reciprocating movement is imparted to the pitman rod 66. This reciprocating movement is communicated to the

pitman rod 65 and multiplied by means of the lever arm 63. In this manner, the device for pressing the covers on the baking pans is given a reciprocating movement by the motor 36, the pulley 84 and the train of gears connected thereto. The gears are so proportioned and the pitman rod 66 is connected to the lever arm 63 at such a point that the device for pressing the covers on the pans is moved at the same rate as the conveyer which carries the pans through the machine. Due to the engagement of the gear 113 with the rack 114, carried by the fixed track 75, the gear 113 is given a rotary motion as the device is moved back and forth. When the device is being moved toward the front of the machine, that is, in a direction opposite to the movement of the conveyer, the pawls 109 ride over the surface of the ratchet wheel and no motion is communicated to the shaft 103. However, when the device is moved in the same direction as the moving conveyer, the pawls 109 engage the ratchet teeth 108 and turn the shaft 103 with the gear 113. This turns the plug 104 so as to admit air from the compressed air supply through the air passage 83 into the piston chamber. This lifts the piston 79 and forces upwardly the inner ends on the ends of links 86. The result of this movement is to lift the presser plate 100 by means of the rods 96 and force the same against the bottom of the conveyer belt so as to clamp the baking pans and their covers between the base plate 72, and the presser plate 100. This securely clamps the covers upon the pans. A further movement of the device causes the gear 113 to rotate so as to turn the plug and open the passage from the pipe 84 to the exhaust head 127 so as to relieve the pressure in the piston chamber and allow the piston 79 to drop. The weight of the presser plate 100 will cause it to drop and aid in returning the parts to their normal position. The slide valve 118 is provided so that the compressed air supply is automatically cut off except when covered baking pans are passing through the machine. This is due to the fact that the bottom edge of the plate 122 engages the pins 138 on the pan covers and lifts the valve rod 119 so as to bring the port 120 into alignment and admit compressed air to the pipe 116. If no pans are passing through the machine, or the pans which are passing through the machine do not have covers thereon, the plate 122 will not be lifted and the air will be cut off.

In Fig. 1 the device for pressing the covers on the baking pans is shown at the beginning of its stroke. As the device is drawn forward by the pitman rod 65 in time with the moving belt, the valve 85 opens so as to admit compressed air to the piston chamber to lift the piston. This lifts the presser plate

against the bottom of the conveyer and clamps the covers on the pans. During the last part of this movement the valve is opened so as to relieve the pressure in the piston chamber and allow the parts to return to their normal position. When the device is ready to start on its return movement, the presser plate is free from the belt and the pans. As the device is moved backward to its first position, the pawls 109 ride on the surface of the ratchet wheel 107 and hence the shaft 103 is not rotated, and the valve is left in the position in which it was at the end of the forward stroke of the device. The device moves backward until it is in its original position when the operation is repeated. It will thus be seen that at each revolution of the cam wheel the device presses the cover on one baking pan and moves back into position to receive a new pan.

It is evident that while I have shown and described electric motors for driving the shredding rolls and the conveyer connected thereto, that other means of driving these parts might be used. Furthermore, while I have described this machine as adapted to treat material prepared in accordance with the process set forth in the application of John L. Kellogg, above referred to, it is evident that this machine may be used for making biscuits from any material requiring a similar treatment. The baking pans are delivered from the rear of the machine and are then placed in the oven for baking.

I show in Fig. VII^a a modification of the grooving of the rolls which is available for use in a machine of this kind, in which both sets of rolls are grooved in accordance with my Patent No. 831,009, of Sept. 25, 1906.

I am aware that the particular embodiment here set forth, is susceptible of considerable variation without departing from the spirit of my invention, and I, therefore, do not wish to be restricted to the same. However, I have found that in actual practice this embodiment is to be preferred, and I desire to claim the same specifically as well as broadly as indicated by the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a machine of the class described, the combination of a frame, sprocket wheels suitably journaled thereon, a conveyer belt carried by said sprocket wheels and adapted to carry baking pans through the machine, means for driving said sprocket wheels, a plurality of sets of shredding rolls journaled on said frame and adapted to deliver layers of shredded material to said baking pans, independent means for driving each set of shredding rolls, a device for pressing covers on said pans, a cam wheel, means for

driving the same operatively connected with said sprocket driving means, and a pitman rod connected to said device for reciprocating the same, reciprocatory motion being communicated to said pitman rod by means of the cam wheel, all coacting as specified.

2. In a machine of the class described, the combination of a frame, sprocket wheels suitably journaled thereon, a conveyer belt carried by said sprocket wheels and adapted to carry baking pans through the machine, means for driving said sprocket wheels, a plurality of sets of shredding rolls journaled on said frame and adapted to deliver layers of shredded material to said baking pans, means for driving said shredding rolls, a device for pressing covers on said pans, a cam wheel, means for driving the same, and a pitman rod connected to said device for reciprocating the same, reciprocatory motion being communicated to said pitman rod by the cam wheel, all coacting substantially as described for the purpose specified.

3. In a machine of the class described, the combination of a frame, sprocket wheels suitably journaled thereon, a conveyer belt carried by said sprocket wheels and adapted to carry baking pans through the machine, means for driving said sprocket wheels, a plurality of sets of shredding rolls journaled on said frame and adapted to deliver layers of shredded material to said baking pans, means for driving said shredding rolls, a device for pressing covers on said pans, and means for reciprocating said device, all coacting substantially as described for the purpose specified.

4. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the machine, and a device for pressing covers on said pans, comprising a base plate carried above said conveyer belt and provided with side members, rollers journaled on said side members, tracks secured to said frame on which said rollers travel, a housing provided on said base plate, a piston chamber in said housing, an air passage communicating with the bottom of said piston chamber, a piston reciprocating in said piston chamber and provided with a piston rod, a collar slidably mounted on said piston rod and resting on a shoulder thereon, links pivoted to the ends of said base plate, levers having forked outer ends pivoted to the upper ends of said links, the inner ends of said levers being pivotally connected to said collar, a presser plate disposed beneath said conveyer belt, rods pivotally connected to said levers and secured to said presser plate, lugs on the side members of said base plate through which said rods pass, a valve controlled by the forward movement of said device, for admitting compressed air to said air passage, means, adapted to be actuated by the

covers on the baking pans, for admitting compressed air to said valve, and means for reciprocating said device.

5. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the machine, and a device for pressing covers on said baking pans, comprising a base plate carried above said conveyer belt and provided with side members, a housing provided on said base plate, a piston chamber in said housing, an air passage communicating with the bottom of said piston chamber, a piston reciprocating in said piston chamber and provided with a piston rod, a collar slidably mounted on said piston rod and resting on a shoulder thereon, links pivoted to the ends of said base plate, levers having forked outer ends pivoted to the upper ends of said links, the inner ends of said levers being pivotally connected to said collar, a presser plate disposed beneath said conveyer belt, rods pivotally connected to said levers, and secured to said presser plate, lugs on the side members of said base plate through which said rods pass, a valve controlled by the forward movement of said device for admitting compressed air to said air passage, means, adapted to be actuated by the covers on the baking pans, for admitting compressed air to said valve, and means for reciprocating said device.

6. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the machine, and a device for pressing covers on said pans, comprising a base plate carried above said conveyer belt and provided with side members, a housing provided on said base plate, a piston chamber in said housing, an air passage communicating with the bottom of said piston chamber, a piston reciprocating in said piston chamber and provided with a piston rod, links pivoted to the ends of said base plate, levers having forked outer ends pivoted to the upper ends of said links, the inner ends of said levers being pivotally connected to said piston rod, a presser plate disposed beneath said conveyer belt, rods pivotally connected to said lever and secured to said presser plate, lugs on the side members of said base plate through which said rods pass, a valve controlled by the forward movement of said device for admitting compressed air to said air passage, means, adapted to be actuated by the covers on said baking pans, for admitting compressed air to said valve and means for reciprocating said device, all coacting substantially as described for the purpose specified.

7. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the machine, and a device for pressing covers

on said pans, comprising a base plate carried above said conveyer belt, a housing provided on said base plate, a piston chamber in said housing, an air passage communicating with the bottom of said piston chamber, a piston reciprocating in said piston chamber and provided with a piston rod, links pivoted to the ends of said base plate, levers having forked outer ends pivoted to the upper ends of said links, the inner ends of said levers being pivotally connected to said piston rod, a presser plate disposed beneath said conveyer belt, means connecting said presser plate with said levers, a valve controlled by the forward movement of said device for admitting compressed air to said air passage, means, adapted to be actuated by the covers on said baking pans, for admitting compressed air to said valve, and means for reciprocating said device, all coacting substantially as described for the purpose specified.

8. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the machine, and a device for pressing covers on said pans, comprising a base plate carried above said conveyer belt, a housing provided on said base plate, a piston chamber in said housing, an air passage communicating with the bottom of said piston chamber, a piston reciprocating in said piston chamber, and provided with a piston rod, levers fulcrumed on the ends of said base plate, the inner ends of said levers being pivotally connected to said piston rod, a presser plate disposed beneath said conveyer belt, means connecting said levers with said presser plate, a valve controlled by the forward movement of said device for admitting compressed air to said air passage, means, adapted to be actuated by the covers on said baking pans, for admitting compressed air to said valve, and means for reciprocating said device, all coacting substantially as described for the purpose specified.

9. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the machine, and a device for pressing covers on said pans, comprising a base plate carried above said conveyer belt, levers fulcrumed on the ends of said base plate, a presser plate disposed beneath said conveyer belt, means connecting said levers with said presser plate, means controlled by the forward movement of said device and the covers on said baking pans for lifting the inner ends of said levers, and means for reciprocating said device, all coacting substantially as described for the purpose specified.

10. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the

machine, and a device for pressing covers on said pans, comprising a base plate carried above said conveyer belt, a housing on said base plate, a piston chamber in said housing, a piston reciprocating in said piston chamber, a presser plate disposed beneath said conveyer belt, means operated by said piston for lifting said presser plate against said conveyer belt, a valve controlled by the forward movement of said device for admitting compressed air to said piston chamber, means, adapted to be actuated by the covers on said pans, for admitting compressed air to said valve and means for reciprocating said device, all coacting substantially as described for the purpose specified.

11. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the machine, and a device for pressing covers on said pans, comprising a base plate carried above said conveyer belt, a housing on said base plate, a piston chamber in said housing, a presser plate disposed beneath said conveyer belt, means operated by said piston for lifting said presser plate against said conveyer belt, a valve for admitting compressed air to said piston chamber, a valve operating shaft suitably journaled on said base plate, a turning plug operating in said valve and carried on one end of said shaft, a ratchet wheel on the other end of said shaft, a gear rotatably mounted on said shaft and in mesh with a rack carried by the frame, pawls pivoted on said gear and engaging ratchet teeth on said ratchet wheel, a spring resiliently holding said pawls in engagement with said ratchet wheel, means adapted to be actuated by the covers on said baking pans, for admitting compressed air to said valve, and means for reciprocating said device, all coacting substantially as described for the purpose specified.

12. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the machine, and a device for pressing covers on said pans, comprising a base plate carried above said conveyer belt, a housing on said base plate, a piston chamber in said housing, a piston reciprocating in said piston chamber, a presser plate disposed beneath said conveyer belt, means operated by said piston for lifting said presser plate against said conveyer belt, a valve for admitting compressed air to said piston chamber, a valve operating shaft suitably journaled on said base plate, a turning plug operating in said valve and carried on one end of said shaft, a ratchet wheel on the other end of said shaft, a gear rotatably mounted on said shaft and in mesh with a rack carried by the frame, means operatively connecting said ratchet wheel with said gear

during the forward movement of the device, means, adapted to be actuated by the covers on the baking pans, for admitting compressed air to said valve and means for reciprocating said device, all coacting substantially as described for the purpose specified.

13. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the machine, and a device for pressing covers on said pans, comprising a base plate carried above said conveyer belt, a housing on said base plate, a piston chamber in said housing, a piston reciprocating in said piston chamber, a presser plate disposed beneath said conveyer belt, means operated by said piston for lifting said presser plate against said conveyer belt, a valve for admitting compressed air to said piston chamber, a suitably journaled valve operating shaft, a turning plug operating in said valve and carried on one end of said shaft, means whereby the forward movement of the device rotates said shaft, means, adapted to be actuated by the covers on said baking pans, for admitting compressed air to said valve, and means for reciprocating said device, all coacting substantially as described for the purpose specified.

14. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the machine, and a device for pressing covers on said pans, comprising a base plate carried above said conveyer belt, a housing on said base plate, a piston chamber in said housing, a piston reciprocating in said piston chamber, a presser plate disposed beneath said conveyer belt, means operated by said piston for lifting said presser plate against said conveyer belt, a valve for admitting compressed air to said piston chamber, means whereby the forward movement of the device opens and closes said valve, means, adapted to be actuated by the covers on said baking pans, for admitting compressed air to said valve, and means for reciprocating said device, all coacting substantially as described for the purpose specified.

15. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the machine, and a device for pressing covers on said pans, comprising a base plate carried above said conveyer belt, a housing on said base plate, a piston chamber in said housing, a piston reciprocating in said piston chamber, a presser plate disposed beneath said conveyer belt, means operated by said piston for lifting said presser plate against said conveyer belt, a valve for admitting compressed air to said piston chamber, means whereby the forward movement

of the device opens and closes said valve, a pipe admitting compressed air to said valve, a slide valve in said pipe comprising a valve rod, a plate secured to the lower end of said rod and adapted to be engaged by pins on the pan covers to lift said rod, a port in said valve rod adapted to be brought into alignment with the passage through said pipe when said plate is lifted, a spring normally holding said rod with the port out of alignment with said passage, and means for reciprocating the device, all coacting substantially as described, for the purpose specified.

16. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the machine, and a device for pressing covers on said pans, comprising a base plate carried above said conveyer belt, a housing on said base plate, a piston chamber in said housing, a piston reciprocating in said piston chamber, a presser plate disposed beneath said conveyer belt, means operated by said piston for lifting said presser plate against said conveyer belt, a valve admitting compressed air to said piston chamber, means whereby the forward movement of the device opens and closes said valve, a pipe admitting compressed air to said valve, a slide valve in said pipe comprising a valve rod, means on the lower end of said valve rod adapted to be engaged by pins on the pan covers to lift said rod, a port in said valve rod adapted to be brought into alignment with the passage through said pipe when said plate is lifted, and means for reciprocating said device, all coacting substantially as described for the purpose specified.

17. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the machine, and a device for pressing covers on said pans, comprising a base plate carried above said conveyer belt, a housing on said base plate, a piston chamber in said housing, a piston reciprocating in said piston chamber, a presser plate disposed beneath said conveyer belt, means operated by said piston for lifting said presser plate against said conveyer belt, a valve admitting compressed air to said piston chamber, means, whereby the forward movement of the device, opens and closes said valve, means, adapted to be actuated by the covers on said baking pans for admitting compressed air to said valve, a pitman rod connected to said presser plate, lever arms journaled on said frame and connected to the other end of said pitman rod, a second pitman rod connected to one of said lever arms, a slotted bar on the other end of said pitman rod, a pin on the outer end of said bar, a cam wheel having a cam slot therein in which said pin engages, a shaft

on which said cam wheel is mounted, said shaft passing through the slot in said bar and means for driving said shaft, all co-acting substantially as described for the purpose specified.

18. In a machine of the class described, the combination of a frame, a conveyer belt adapted to carry baking pans through the machine, and a device for pressing covers on said pans, comprising a base plate carried above said conveyer belt, a housing on said base plate, a piston chamber in said housing, a piston reciprocating in said piston chamber, a presser plate disposed beneath said conveyer belt, means operated by said piston for lifting said presser plate against said conveyer belt, a valve admitting compressed air to said piston chamber, means, whereby the forward movement of

the device opens and closes said valve, means adapted to be actuated by the covers on said baking pans for admitting compressed air to said valve, a pitman rod connected to said presser plate, lever arms journaled on said frame and connected to the other end of said pitman rod, a second pitman rod connected to one of said lever arms, means for reciprocating said second pitman rod, all coacting substantially as described for the purpose specified.

In witness whereof, I have hereunto set my hand and seal in the presence of two witnesses.

RALPH E. VALENTINE. [L. S.]

Witnesses:

C. B. DES JARDINS,

G. B. THOMPSON.

UNITED STATES PATENT OFFICE.

JOHN L. KELLOGG, OF BATTLE CREEK, MICHIGAN, ASSIGNOR TO KELLOGG TOASTED CORN FLAKE CO., OF BATTLE CREEK, MICHIGAN.

PROCESS OF PREPARING SHREDDED CEREAL PRODUCTS.

1,159,045.

Specification of Letters Patent.

Patented Nov. 2, 1915.

No Drawing.

Application filed September 16, 1912. Serial No. 730,471.

To all whom it may concern:

Be it known that I, JOHN L. KELLOGG, a citizen of the United States, residing at Battle Creek, Michigan, have invented certain new and useful Improvements in Process of Preparing Shredded Cereal Products, of which the following is a specification.

This invention relates to improvements in shredded cereal products and the process of preparing same.

The objects of this invention are: First, to provide a superior shredded wheat or cereal food product in which the product has been thoroughly and completely cooked and aerated. Second, to provide an improved process of thus treating wheat or similar cereal.

My invention relates to and is particularly adapted for the treatment of whole wheat, but other grains may be similarly treated.

In the preferred method and process I take whole wheat and grind the same on a French bur stone to crush and not cut and destroy the texture. To a six hundred pound batch of such whole wheat unbolted flour, I add two hundred and fifty pounds of water in which I have previously thoroughly dissolved six per cent. of sugar and two per cent. of salt. I then mix the flour in this water with a rotary mixer very thoroughly for a period of ten minutes, or thereabout, until the mass is a very thick, heavy dough. This dough is delivered from the mixer and rolled out into a thick slab about two inches thick, and preferably into a layer about twenty-four inches wide and twelve inches long, the material, passing under a suitable roller for the purpose. This heavy dough is then placed in covered pans and put in a steam retort, where it is subjected to steam heat for a period of about one and one half hours at fifteen pounds' pressure, which gives a temperature of about 250 degrees Fahr. The material thus cooked is taken from the pans and placed in wire racks where it is dried for a period of twenty-four hours in the open air. This dried and cooked dough is then passed through a rotary swing hammer breaker, which breaks the material up into cubes about one inch square. These lumps are then passed through a breaker or grinder which reduces to dimensions of about the size of a split pea.

The material thus reduced to the size of a pea is passed through a Hess drier, or similar drier, and a current of dry air is delivered through the same until the material is thoroughly air dried. The material in the air dried condition is then passed through shredding rollers and delivered in layers to suitable bake pans and is cut up into suitable biscuits, or any form that may be desired and suitably compressed and passed in the baking pans, suitably covered, to a suitable oven where the same is baked for thirty minutes at a temperature of from 450° to 500° Fahr. This thoroughly bakes the material, and it is then passed from the baking oven, removed from the bake pans and passed through a drying oven, where, for a period of one hour, a current of air at a temperature of from 250° to 300° Fahr. is caused to circulate over and through the biscuits or shredded material thus formed. The biscuit, when thus thoroughly cooked and dried, has much the appearance of the ordinary shredded wheat biscuit, the difference being that the material is thoroughly cooked and converted to dextrin, making a very digestible aerated bread or food, the other constituents not being destroyed but thoroughly cooked.

I desire to state that this process can be considerably varied. It is a requirement that the flour be whole wheat or whole grain flour, and that the same be ground by crushing, as distinguished from a cutting of the texture of the grain. The grain should be thoroughly treated and mixed and steamed, and thereafter reduced to granules, shredded, baked and dried in order to secure the best results. A fairly complete conversion of the starchy material to dextrin is accomplished without injury to the food values of the other constituents of the grain, and the whole is aerated and light and palatable.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The process of preparing a 'shredded biscuit consisting in first grinding the grain by a crushing action, second, cooking the same in a suitable steam retort at about fifteen pounds' pressure, air drying the steamed mass for substantially twenty-four hours, reducing the dried mass to granules, air drying the granules in a current of air, subjecting the granules to the action of

shredding rollers, baking the material in covered pans in an oven at a temperature of from 400° to 500° Fahr., and removing from the pans and drying the same in an air current at a temperature of 250° to 300° Fahr.

2. The process of preparing a shredded biscuit consisting in first grinding the grain by a crushing action, second, cooking the same in a suitable steam retort at about fifteen pounds' pressure, air drying the steamed mass, reducing the dried mass to granules, air drying the granules, subjecting

the granules to the action of shredding rollers, baking the material in covered pans in an oven at a temperature of from 400° to 500° Fahr., and removing from the pans and drying the same at a temperature of 250° to 300° Fahr.

In witness whereof, I have hereunto set my hand and seal in the presence of two witnesses.

JOHN L. KELLOGG. [L. S.]

Witnesses:

CHAS. M. MARBLE,
H. E. RALPH.

UNITED STATES PATENT OFFICE.

JOHN LEONARD KELLOGG, OF BATTLE CREEK, MICHIGAN, ASSIGNOR TO KELLOGG
TOASTED CORN FLAKE COMPANY, OF BATTLE CREEK, MICHIGAN, A CORPORATION
OF MICHIGAN.

MANUFACTURE OF BRAN FOOD.

1,189,130.

Specification of Letters Patent.

Patented June 27, 1916.

No Drawing.

Application filed December 18, 1915. Serial No. 67,504.

To all whom it may concern:

Be it known that I, JOHN LEONARD KELLOGG, a citizen of the United States, residing in Battle Creek, in the county of Calhoun and State of Michigan, have invented a new and useful Improvement in the Manufacture of Bran Food, of which the following is a specification.

My invention relates to the manufacture of laxative food products from bran wholly or in combination with cereals or other healthful materials, and has for its principal object to provide bran food products of this nature in the form of loose shreds and also in the form of a shredded biscuit, which will be more digestible, palatable and appetizing than the bran foods commonly sold, and which can be eaten alone or in combination with any other cereal food, or with sugar and cream or other food elements like other cereal foods.

My invention consists of certain improvements in the process of preparing bran food products and also in bran food products, and in order that my invention may be fully understood, I shall first set forth in detail the mode in which I at present prefer to carry my invention into practice and then particularly point out in the claims the novel features of the improved process and product.

In carrying my invention into practice, I at present take the desired quantity of pure bran, preferably wheat bran, that has been thoroughly cleansed, thoroughly moisten the same and place it by preference in shallow pans. The pans I at present use are approximately 24 inches long by 12 inches wide and 6 inches deep. I then place the pans, by preference, in an ordinary steam retort and cook the bran at about 250° F. temperature for from thirty minutes to one hour.

Before or after the cooking process, I may mix with the bran any desired quantity from 5% to 50% of whole wheat or other gelatinous cereal flour or any other suitable starch-bearing material. After the bran, with or without the added starch-bearing material, is thus cooked, it is dried in the ordinary hot air drier, which leaves the cooked bran or mixture in a more or less lumpy condition. These lumps are then preferably

pressed through a one-quarter inch wire mesh, so as to make the material into tiny lumps which may be about the size of a kernel of rice. These tiny lumps are then fed through shredding mills of the ordinary kind.

To make the product in the form of loose shreds, the shredding mills are preferably of such character as to make the separate shreds of varying curly and wavy ribbon-like form. To make the product in the form of biscuit, the shredding mills are of such a character as to make the separate shreds either in the same curly and wavy ribbon-like form, but preferably in the ordinary fine filamentary form.

In making the loose ribbon-like shreds, the elongated shreds are caught from the shredding mills, preferably on an ordinary conveyer belt and distributed into an ordinary flight oven, wherein they drop from one flight to another to the bottom where the shreds are finally toasted. These toasted bran shreds are then, by preference, broken into particles of crisp, short, curly and wavy ribbon-like form in which form the product is ready for the market, this form being shown in my pending application for patent filed May 17, 1915, Serial No. 28,586.

This product, owing to the described process of manufacture, is thoroughly cooked, is exceptionally palatable, digestible, appetizing and healthful, and owing to its attractive crisp, curly and wavy ribbon-like form has an exceptionally appetizing appearance.

In making the bran biscuit, the fine shreds, at present preferably used for this product, formed as above described by the shredding mills, are gathered, preferably on an endless belt and pressed into biscuit of any suitable form, which are baked in suitable ovens for about thirty minutes at a temperature of from about 450° to 500° F. A current of dried air is then by preference caused to circulate over and through the biscuits thus formed, thoroughly to dry the same, whereby the final product is formed ready for the market. These biscuits, owing to the described process of manufacture, possess an easy digestibility and are exceptionally palatable, appetizing and healthful.

It is evident that the process above described may be greatly varied in the charac-

ter of its performance and in the ingredients and appliances employed, without departing from the scope or spirit of my invention, which is defined by the following claims.

5 I claim as my invention:

10 1. A process of preparing a shredded bran food, during the performance of which the bran is moistened, cooked and dried, reduced to small particles, and the particles shredded and baked or toasted.

15 2. A process of preparing a shredded bran food, during the performance of which the bran is moistened, cooked and dried, and starch-bearing material added thereto, the mixture reduced to small particles, and the particles shredded and baked or toasted.

20 3. A process of preparing a shredded bran food, during the performance of which the bran is moistened, cooked and dried, and reduced to small particles, the small particles

shredded into elongated ribbon-like shreds, and the ribbon-like shreds baked or toasted.

4. A process of preparing a shredded bran food, during the performance of which the bran is moistened, cooked and dried, and reduced to small particles, the small particles shredded, the shreds molded into biscuit form and the biscuits baked or toasted.

5. A shredded bran food consisting of a mass of separate shreds.

6. A shredded bran food consisting of a mass of separate curly shreds.

7. A shredded bran food consisting of a mass of separate wavy shreds.

8. A shredded bran food consisting of a mass of separate ribbon-like shreds.

9. A shredded bran biscuit consisting of separate shreds pressed together.

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UNITED STATES PATENT OFFICE.

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MANUFACTURE OF SHREDDED-CEREAL BISCUIT.

1,197,397.

Specification of Letters Patent.

Patented Sept. 5, 1916.

No Drawing. Original application filed May 17, 1914, Serial No. 25,594. Divided and this application filed December 31, 1915. Serial No. 69,328.

To all whom it may concern:

Be it known that I, JOHN L. KELLOGG, a citizen of the United States, residing in Battle Creek, in the county of Calhoun and State of Michigan, have invented a new and useful Improvement in the Manufacture of Shredded-Cereal Biscuit, of which the following is a specification.

My invention relates to the manufacture of shredded cereal foods from grains, such as wheat, corn, oats, rye and malt, and has for its primary object to provide an improved method of introducing an artificial flavoring into the product, and to make a product having such improved flavoring, which has been thoroughly and completely cooked and aerated, and also having an exceptionally attractive and appetizing form and appearance.

Before my present invention shredded cereal foods such as shredded wheat and shredded wheat biscuit were usually manufactured from the grains without the use of flavoring, the grains being, in one process, boiled for about thirty (30) minutes or until partly cooked, allowed to temper for a few hours and then shredded. It was usually found impossible to cook any saccharine flavoring or salt into wheat, for example, without impairing the shredding qualities of the grain. Wheat, especially, has an outside coating of bran which is impossible to penetrate with a syrup, the syrup sticking to the outside of the berry. When the berry was shredded, it was found that the particles of wheat would not stick together and form a shred on account of the syrup producing an action which would not allow the carbohydrates of the grains to unite. I, therefore, conceived the idea of pulverizing the grain, such as wheat, corn, oats, rye or malt, into a fine flour, mixing therewith the flavoring material, such as sugar, malt extract, salt and water in sufficient quantities to give the flavor desired; mixing the whole into a stiff dough; and forming the same, by preference, into small individual slabs. These slabs were then cooked and dried and broken up into small particles. These particles were then in the preferred process air dried and placed in the shredding mills and reduced to shreds of, by preference, elongated, ribbon-like form. These elongated ribbon-like shreds from the shredding mills were cut up and pressed into biscuit form and

baked in special ovens to form light biscuits consisting of the crisp, curly and wavy ribbon-like shreds interlaced and united.

In order that my invention may be fully understood, I shall first describe in detail the mode in which I carry the same into practice.

In the preparation of the ribbon shred cereal biscuit, I prefer first to pulverize the grain, which may be whole wheat, corn, oats, rye, malt or other suitable cereal, into a fine flour, preferably on a French bur stone so as to crush but not cut and destroy the texture. To, for example, six hundred pounds of such whole wheat unbolting flour, I add, by preference, two hundred and fifty pounds of water in which I have previously thoroughly dissolved six per cent. of sugar and two per cent. of salt. I then mix the flour in this solution with a rotary mixer very thoroughly for a period of about ten minutes until the mass is a thick, heavy dough. I then by preference break the dough through an ordinary dough breaker, and roll or mold it, preferably, into small individual slabs. In actual practice, I make these slabs about 12" wide, 24" long and 2" or 3" thick. These slabs are then cooked preferably by laying them in ordinary steel trays one on top of the other and placing the trays in an ordinary canner's steam retort and cooking them for about an hour and a half at about fifteen pounds steam pressure, which gives a temperature of about 250° F. After cooking, the slabs are by preference piled up in wire racks and allowed to dry in the atmosphere until quite dry. It generally takes from twenty-four to forty hours to accomplish this drying. These cooked and dried slabs are then, by preference, broken up by ordinary swing hammer mills into rough cubes about one inch square, and then by a breaker or a grinder into small particles about the size of a pea or grain of wheat. These particles are then, by preference, passed through a Hess drier or similar drier and a current of dry air delivered through the same until the material is deprived of all surplus moisture and reduced to the proper consistency for shredding. The dried particles are then placed, by preference, in shredding mills of the ordinary kind and shredded so as to form shreds of

elongated ribbon-like form. The elongated ribbon-like shreds, formed as above described by the shredding mills, are, by preference, gathered upon an endless belt from ten or more strands, cut and pressed into biscuits and baked in suitable ovens for about thirty minutes at a temperature of from 450° to 500° F. A current of dried air is then, by preference, caused to circulate over and through the biscuits thus formed, thoroughly to dry the same, forming the final product, ready for the market. These biscuits, owing to the attractive curly and wavy ribbon-like form of their loosely interlaced and united constituent strands, present an exceptionally appetizing appearance to the eye and possess also the easy digestibility and a peculiarly palatable flavor imparted by this process of manufacture.

I claim as my invention:

1. A process of preparing a shredded

cereal food biscuit, during the performance of which the cereal grain is pulverized and mixed with water to form a dough, the dough cooked, dried and broken into small particles, the particles shredded into elongated flat ribbons, the flat ribbons cut up into shorter pieces, the pieces pressed together into biscuit form, and the biscuits baked or toasted.

2. A process of preparing a shredded cereal biscuit during the performance of which small pieces of a cooked and dried cereal material are shredded into elongated flat ribbons, the elongated ribbons cut up into shorter pieces, the pieces pressed into biscuits, and the biscuits baked or toasted.

3. A shredded cereal food biscuit consisting of dried elongated flat ribbons cut up into shorter pieces and the pieces pressed together and baked or toasted.

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Dec. 2, 1930.

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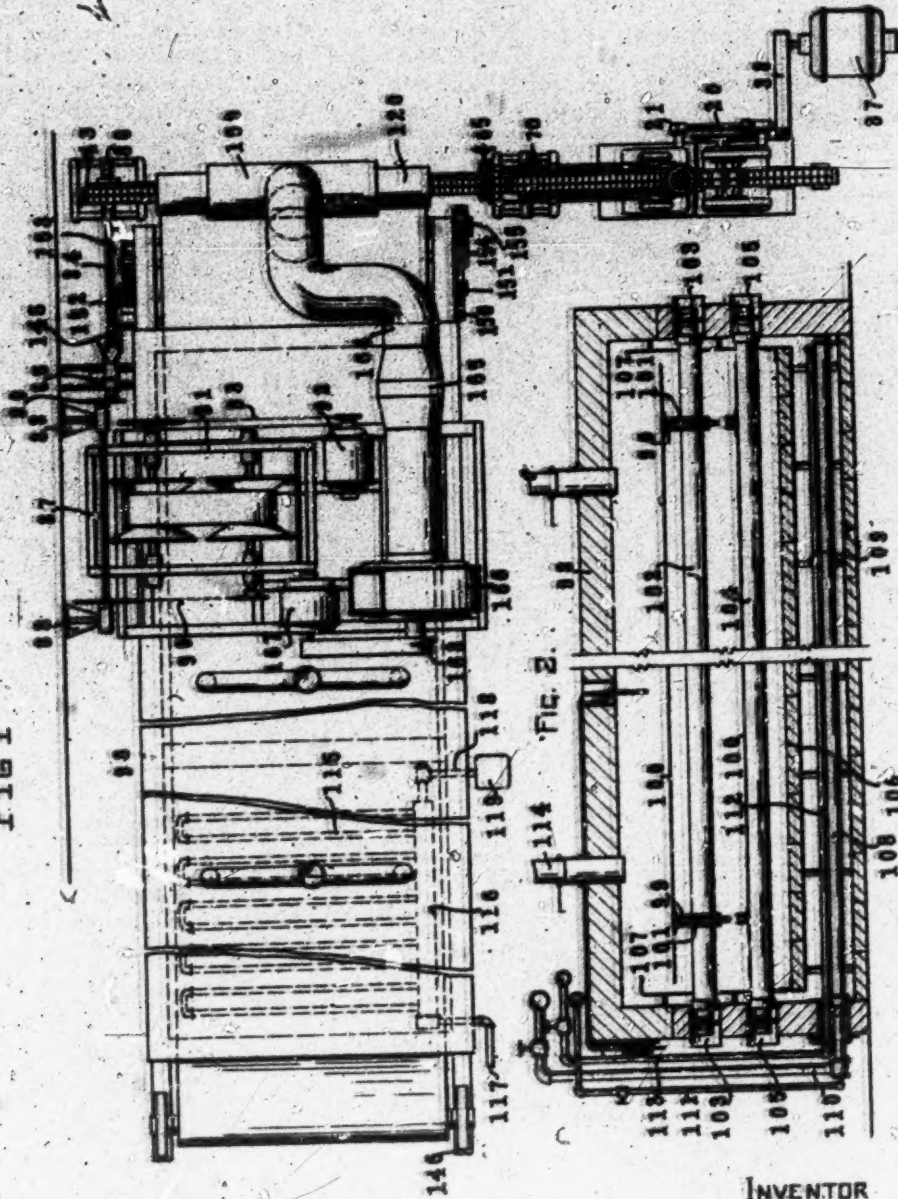
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COMBINATION TOASTING AND SHREDDING OVEN

Filed Nov. 9, 1922

10 Sheets-Sheet 1

Fig. 1



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COMBINATION TOASTING AND SHREDDING OVEN

Filed Nov. 9, 1922

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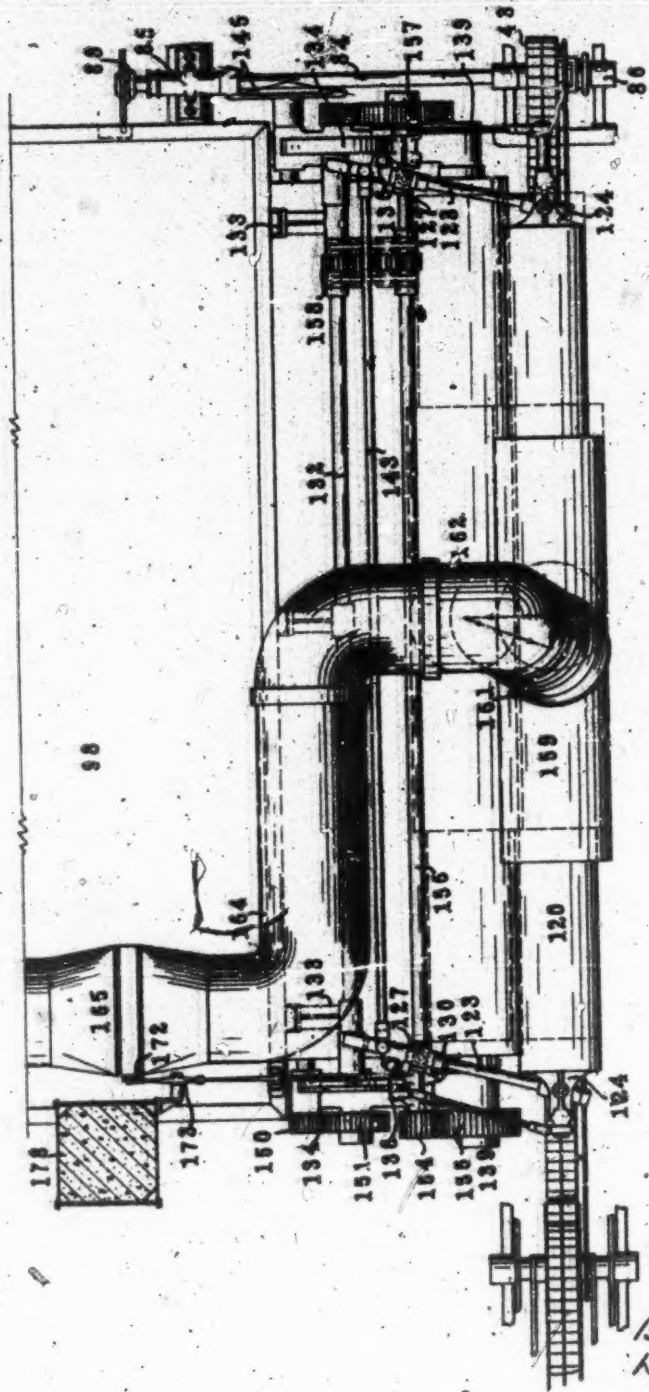


FIG. 3.

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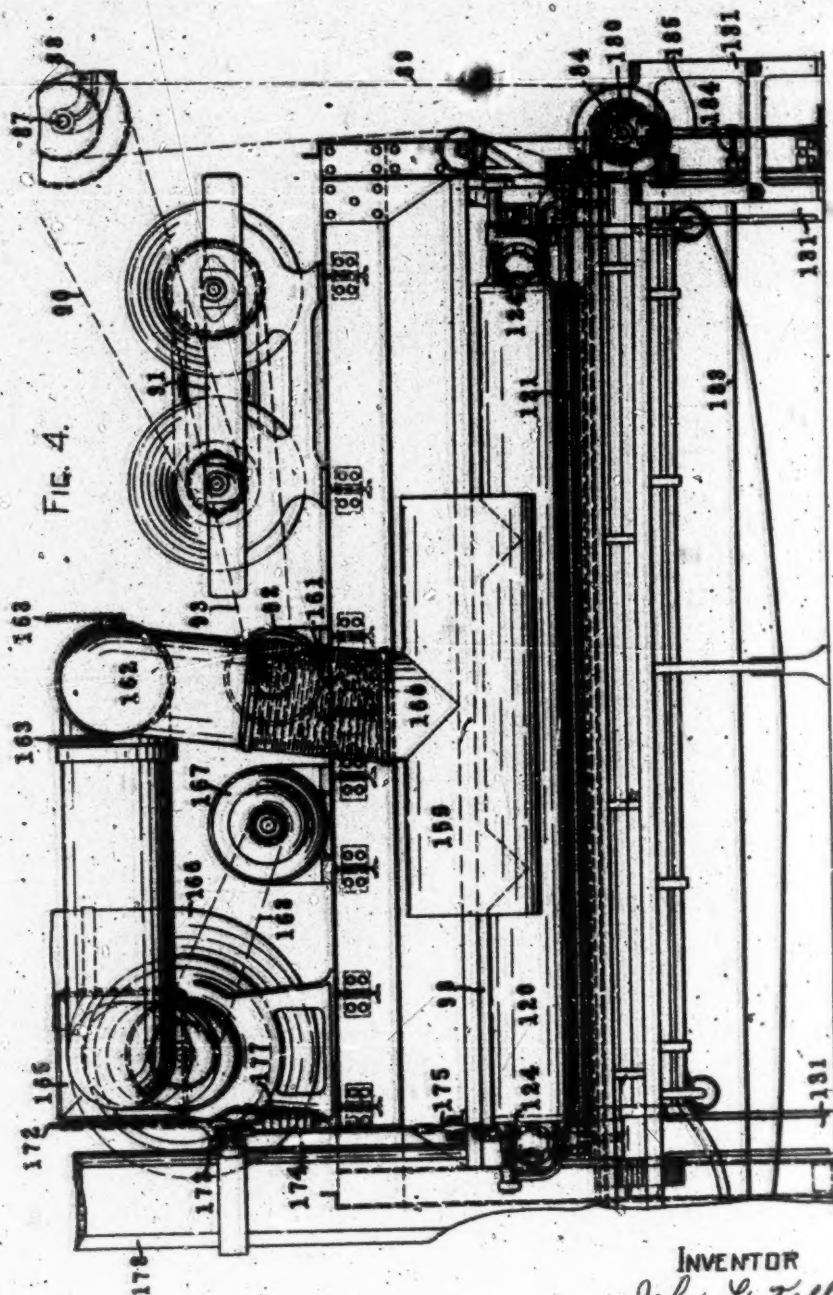
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COMBINATION TOASTING AND SHREDDING OVEN

Filed Nov. 9, 1922

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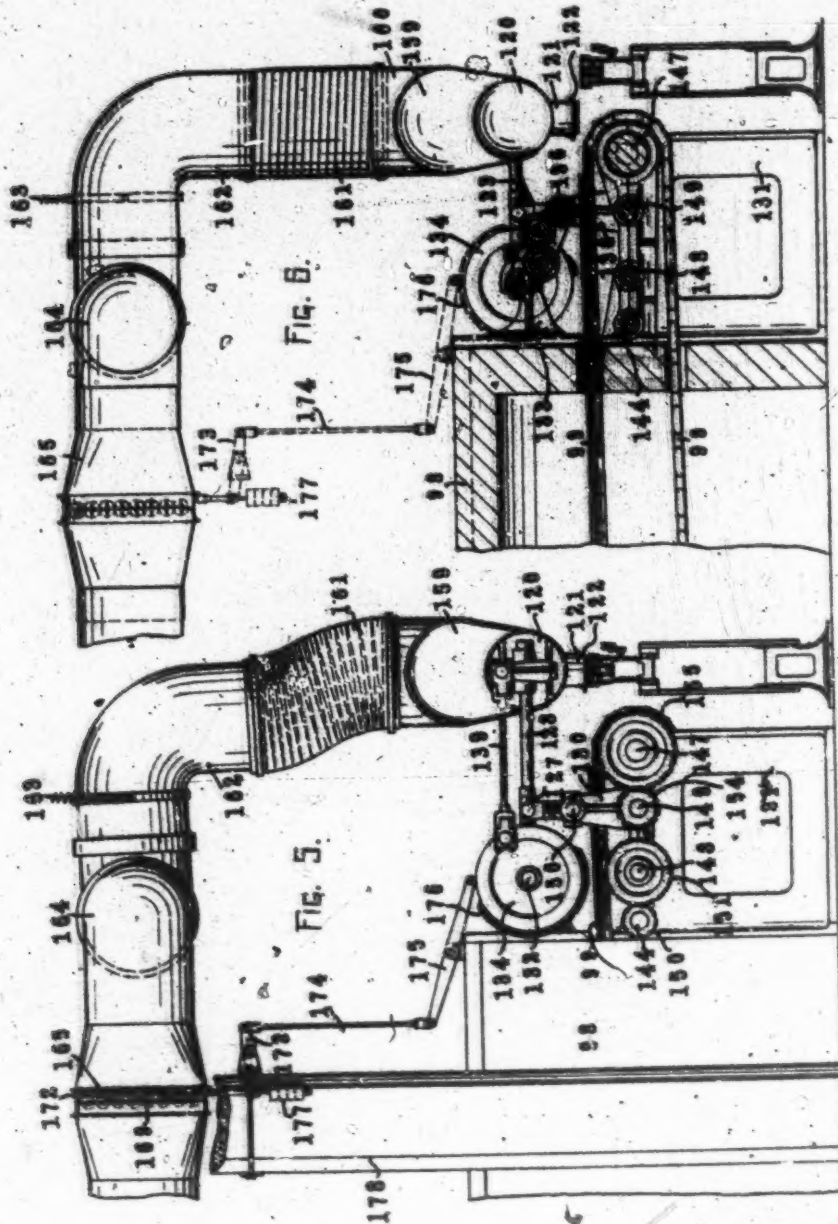
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COMBINATION TOASTING AND SHREDDING OVEN

Filed Nov. 9, 1922

10 Sheets-Sheet 4



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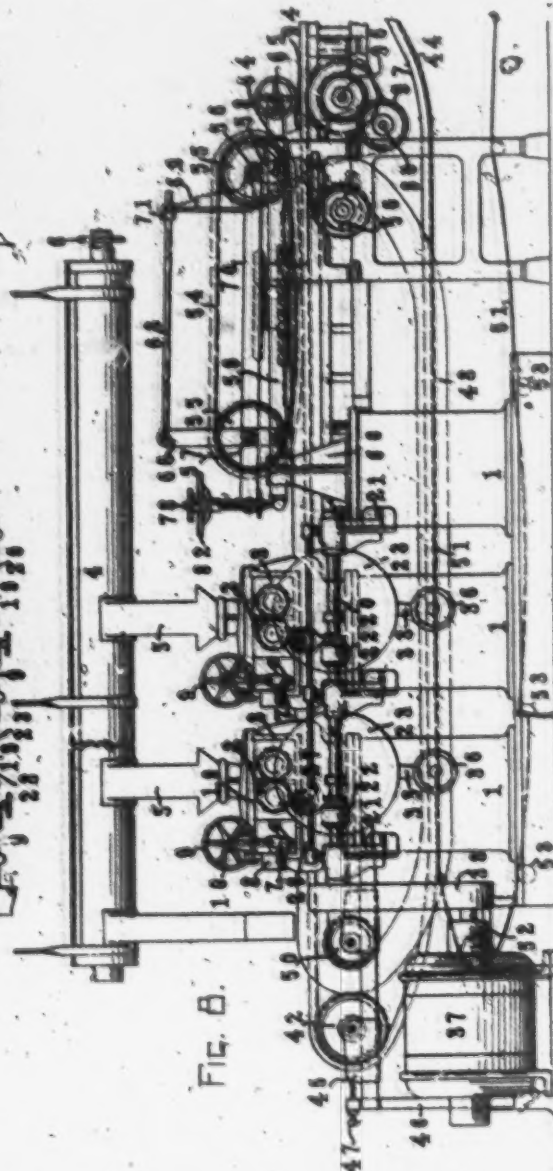
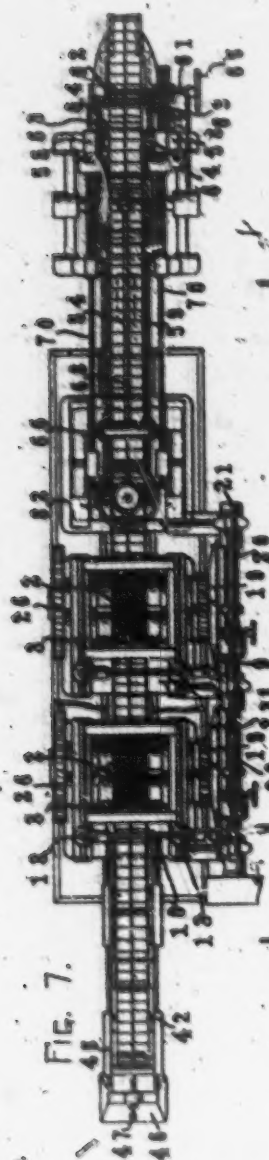
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COMBINATION TOASTING AND SHREDDING OVEN

Filed Nov. 9, 1922

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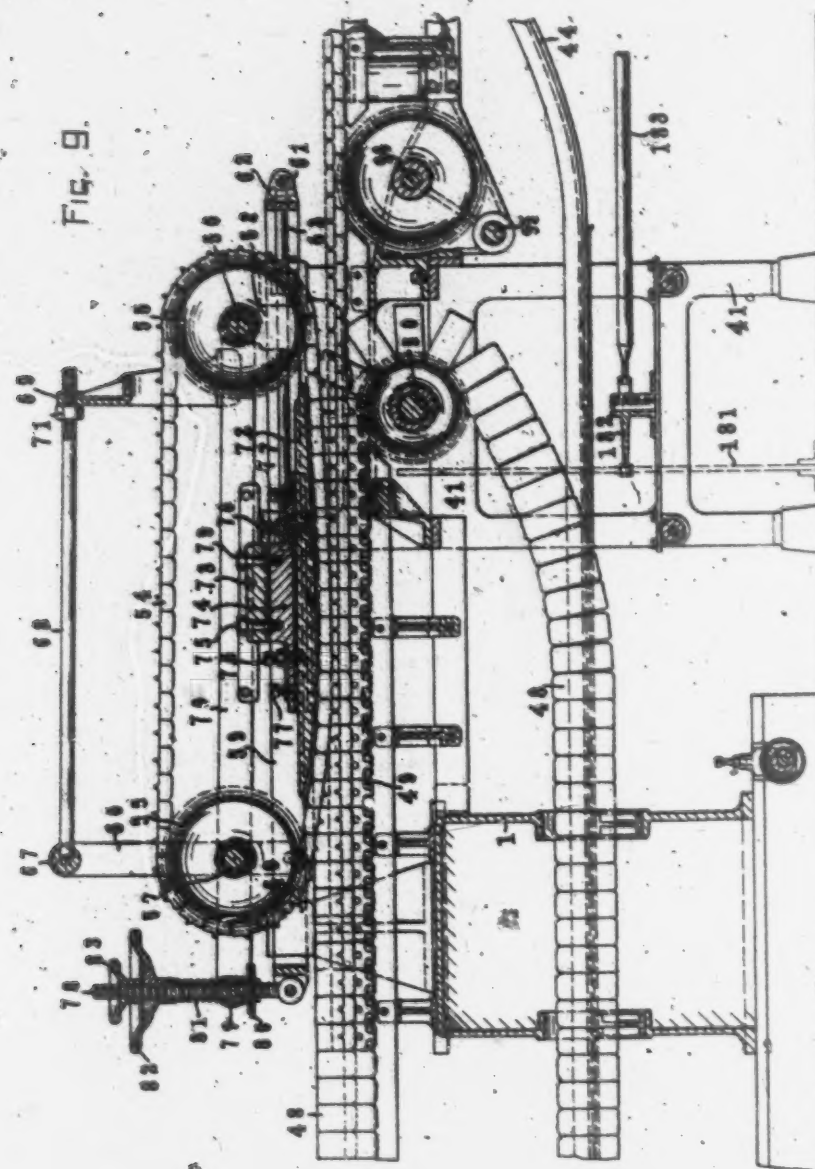
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COMBINATION TOASTING AND SHREDDING OVEN

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COMBINATION TOASTING AND SHREDDING OVEN

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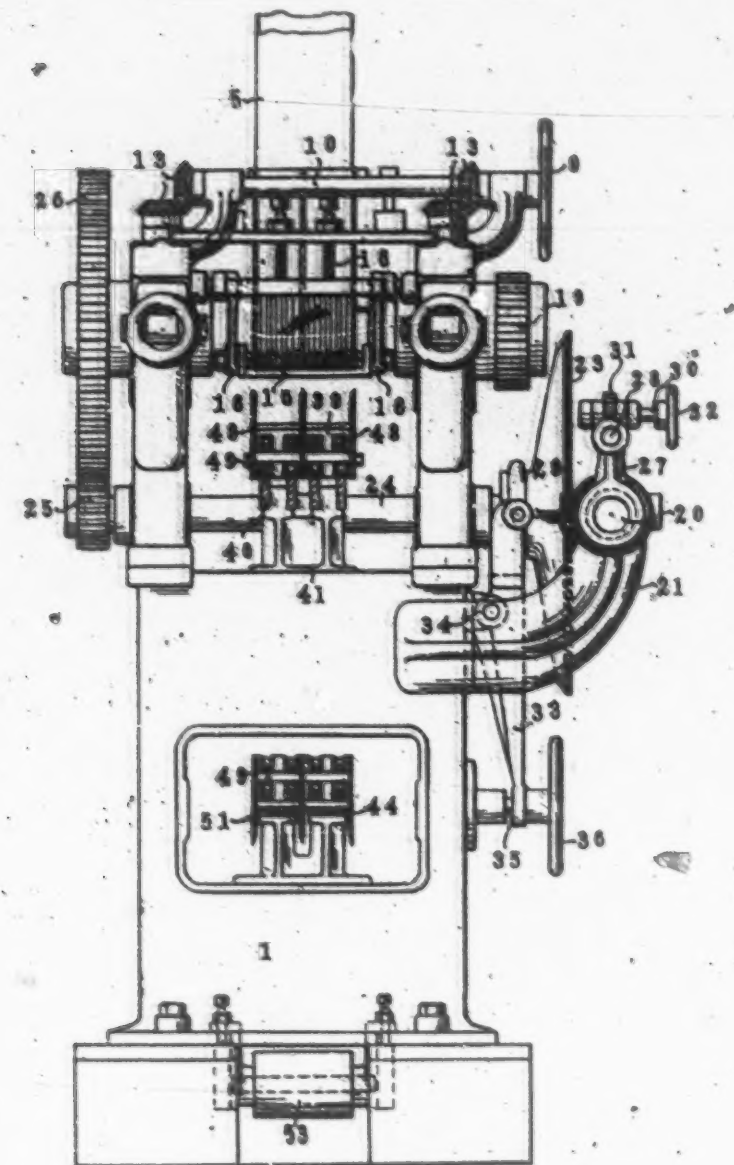


FIG. 10

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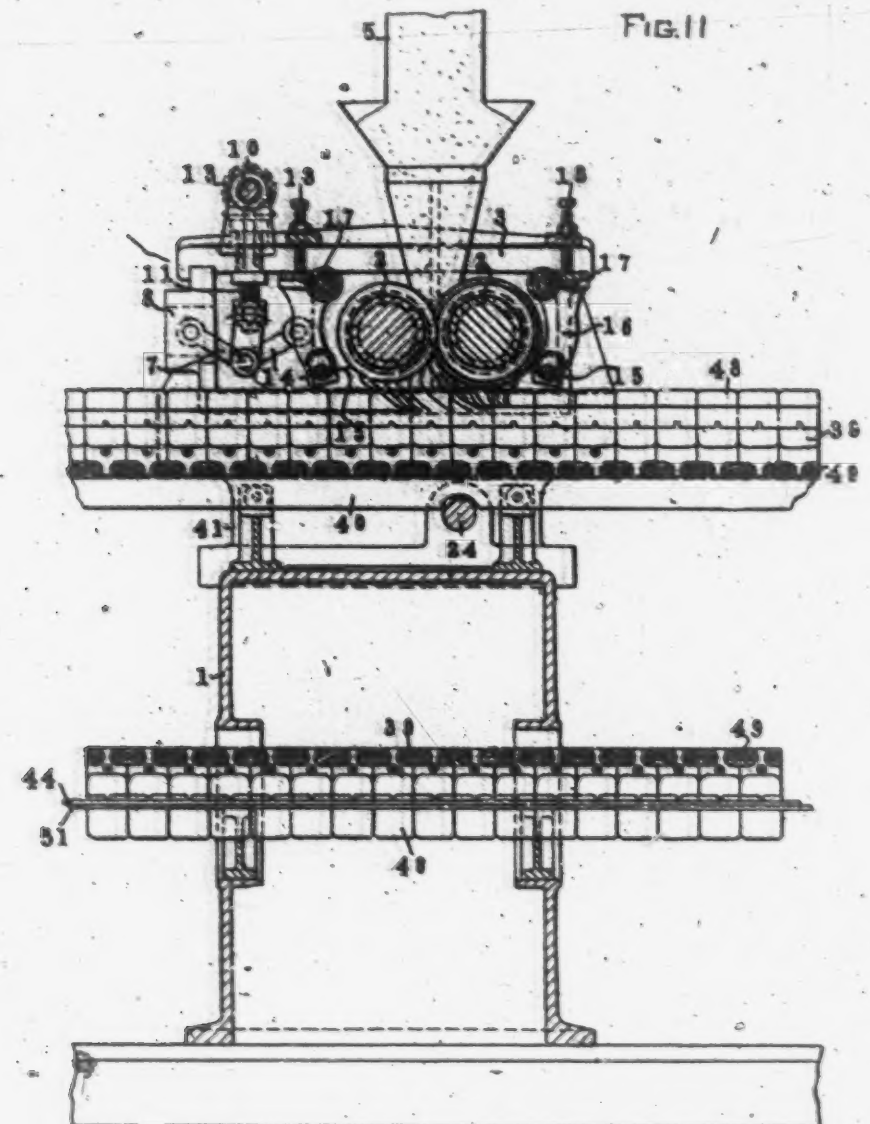
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COMBINATION TOASTING AND SHREDDING OVEN

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10 Sheets-Sheet 8



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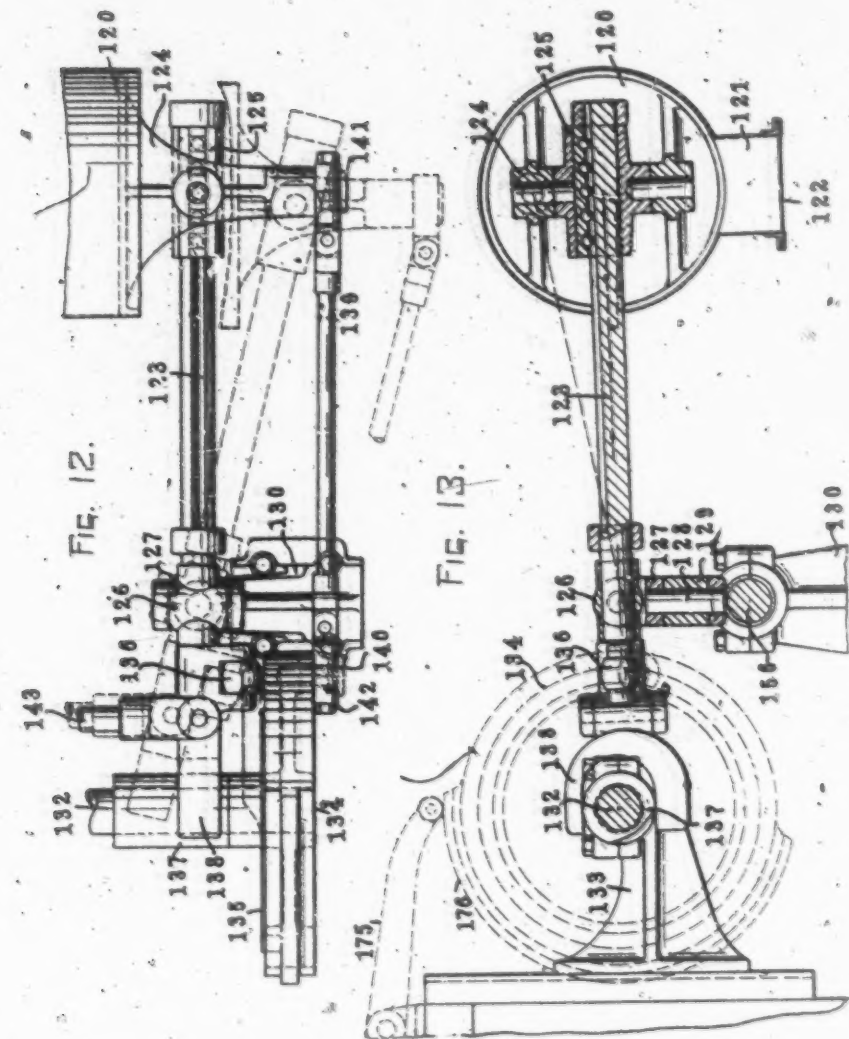
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COMBINATION TOASTING AND SHREDDING OVEN

Filed Nov. 9, 1922.

10 Sheets-Sheet 9



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COMBINATION TOASTING AND SHREDDING OVEN

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FIG 14

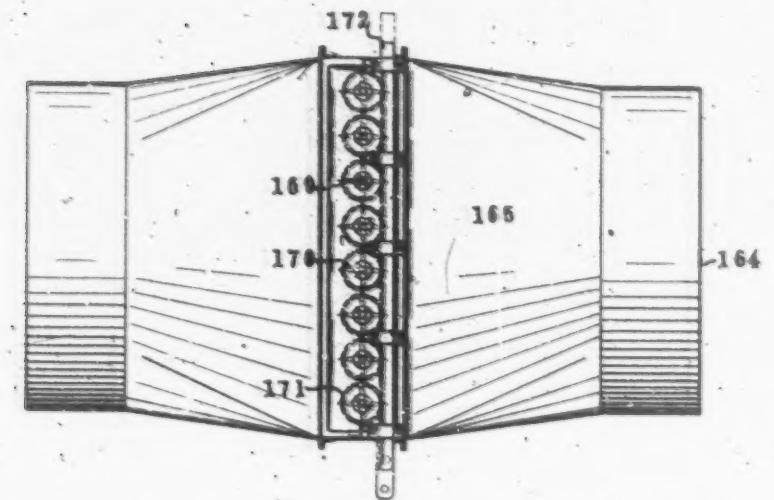
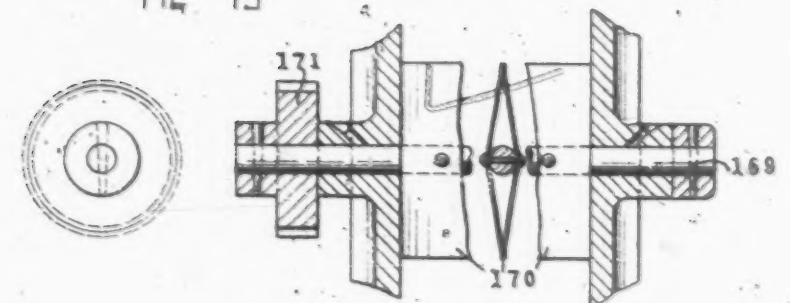


FIG 15



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COMBINATION TOASTING AND SHREDDING OVEN

Application filed November 9, 1922. Serial No. 590,575.

This invention relates to an improvement in a combination shredding machine and toasting oven, and with respect to its more specific features to mechanism for forming the shredded material into biscuits and for transferring the biscuits to the oven.

An object of the present invention is to provide in a unitary structure, mechanisms for shredding cereals, for forming the shredded cereal into biscuits, and for puffing and drying the biscuits.

Another object is to provide mechanism in the form of cooperating upper and lower mold sections movable over endless paths arranged to superpose the upper sections on the lower sections during a portion of their travel.

Another object is to provide means to form limiting walls at the opposite sides of the lower mold sections during the feeding of the material and the forming of the same into biscuits.

Another object is to provide means for coordinating the movement of the upper and lower sections to cause them to register during the superposing of the sections.

Another object is to provide mechanism for bodily moving the sections of one series to correct inaccuracies of register and timing.

Another object is to provide means controlled by the moving of the sections, to press them together when they are superposed thereby to separate the shreds of the material between the biscuits.

Another object is to provide molding mechanism, in the form of a series of molds, movable in succession past the shredding mechanism, and controlled to open and closed position by the movement of the molds.

Another object is to provide an oven, having one end arranged to puff the biscuits and the other end arranged to dry the biscuits, and having in connection therewith a conveyor for moving the formed biscuits through the oven.

Another object is to provide mechanism for transferring the biscuits from the forming means to the conveyor without interfering with the continuous movement of either the forming means or the conveyor.

Another object is to provide in the transferring mechanism a pick-up head moving during portions of its travel adjacent to the forming means and to the conveyor, and at the same speed, to transfer the biscuits from the forming means to the conveyor, wherein the pick-up mechanism is controlled by the movement of the said means.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings forming a part of this specification wherein similar reference characters refer to similar parts throughout the several views,

Figure 1 is a top plan view of the improved machine and oven,

Fig. 2 is a transverse vertical section through the oven at the puffing chamber,

Fig. 3 is a top plan view of the transferring mechanism,

Fig. 4 is a front elevation,

Fig. 5 is an end view with the parts in one position,

Fig. 6 is a similar view with the parts in another position and with parts in section,

Fig. 7 is a plan view of the shredding machine,

Fig. 8 is a front elevation,

Fig. 9 is a longitudinal vertical section through the biscuit forming mechanism,

Fig. 10 is an end view of the shredding machine with parts in section,

Fig. 11 is a longitudinal section through the shredding mechanism,

Fig. 12 is a detail in plan of one of the supporting arms for the transferring mechanism, and its connections,

Fig. 13 is a section on the line 13—13 of Fig. 12,

Fig. 14 is an enlarged side view of the controlling valves for the suction head, and

Fig. 15 is a detail sectional view of one of the valves.

In the present embodiment of the invention, a shredding mechanism is provided for shredding cereal, the said mechanism consisting of one or more shredding mills, which convert the material into shreds, and deliver the shreds to mechanism which forms them into biscuits. The mechanism for forming the shreds into biscuits is constituted by endless chains of upper and lower mold sections arranged to travel over endless paths and with the upper sections superposed on the lower sections during a part of their travel. The shredded material is fed into the lower sections, before the upper sections are superposed thereon, and mechanism is provided to form limiting walls at the opposite sides of the lower sections, during the filling thereof, and during the early part of their movement with the upper sections superposed. The oven, which is composed of two chambers, one of which is heated by gas, and is designed to puff the biscuits, the other being heated by steam, and designed to dry the biscuits, receives the formed biscuits, and bakes them. The biscuits are passed through the oven by a continuously moving conveyor, and transferring mechanism is provided for removing the biscuits from the forming mechanism and transferring them to the conveyor, arranged to travel between the forming mechanism and the conveyor, and to travel with said mechanism and conveyor when picking up the biscuits from the forming mechanism and depositing them on the conveyor.

Referring to Figures 1, 7, 8, 10 and 11, in which the shredding mechanism is more particularly shown, it will be noted that one or more shredding mills is provided, each of which is supported by a base 1, and each mill comprises a pair of annularly grooved rolls 2 journaled to rotate on parallel axes in a suitable casing 3, which is mounted on the base 1. The mills are arranged alongside each other, and they are supplied with a suitable cereal to be shredded, from a trough 4 which has discharge chutes 5 delivering to the respective mills, and the shredded material passes from between the rolls onto an endless chain of lower mold sections, to be presently described. The cereal is fed through the trough 4, by a screw conveyor, driven from a suitable source of power, by means of a sprocket wheel 6. The rolls 2 are adjustable toward and from each other, by means of toggle mechanism indicated at 7, arranged between the support of one roll and a fixed abutment 8 supported by the base 1. The toggle is operated by a hand wheel 9 on a shaft 10 journaled transversely of the casing 3, and connected to vertical screws 11 having threaded connection with the casing 3, by means of bevel gearing 13. The lower ends of the screws are connected to the toggles by links 14, and by moving the screws

in the proper direction, the toggles may be bent or straightened, to move the adjacent roll 2 toward or from the other roll. The shredded material is removed from the grooves of the rolls by means of scraper plates 15 engaging the grooves, and supported by arms 16 pivoted at 17 to the casing 3. The scrapers are adjusted toward and from the rolls by means of set screws 18 threaded through the casing 3, and engaging the arms 16 to swing the lower ends of the arms toward and from the rolls, and each set screw has a lock nut for holding it in adjusted position. The rolls 2 have intermeshing gears 19, and they are driven from a drive shaft 20 journaled in brackets 21 on the base 1. The shaft has a friction roller 22, at each mill, which engages the face of a friction disc 23, secured to a shaft 24 journaled transversely of the casing 3, and has at the end remote from the friction disc a pinion 25 which meshes with a gear wheel 26 on the shaft of the adjacent roll 2. Each friction roller 22 is adjustable longitudinally of the shaft 20, to engage the adjacent disc 23 nearer to or farther from the center thereof, thereby to increase or diminish the speed of rotation of the rolls. The rollers are moved by means of forks 27 which engage annular grooves in the hubs of the rollers, and the forks are slidable on a rack shaft 28 supported above the shaft 20 in parallelism therewith. The bodies of the forks 27 have bearings 29 slidable on the rack shaft, and a shaft 30 is journaled in each bearing, transversely of the rack shaft. Each shaft 30 (see Fig. 10) has a pinion 31 meshing with the rack shaft, and a hand wheel 32 for rotating the shaft. By turning the wheel 32 in the proper direction, the fork may be slid longitudinally of the rack shaft, to move the roller 22 toward or from the center of the disc 23. The disc 23 may be moved away from the roller 22 to stop the operation of the adjacent mill, by means of a lever 33. Each of these levers is pivoted at 34 to the base 1 of the mill, and has a rotatable connection with the hub of the disc 23 at its upper end. The lower end has a bearing engaging a screw 35 extending outwardly from the base and having threaded thereon outside the bearing a handled screw 36. By turning the screw 36 in the proper direction, the disc may be moved out of contact with the friction roller, to stop the operation of the adjacent mill. The shaft 20 is driven by a suitable motor 37, in the present instance an electric motor, which is connected to the shaft by a belt 38.

The shredded material is fed to lower mold sections 39, which are linked together in an endless chain, the upper run of the chain being horizontal, and moving below the shredding mills. The upper run of the chain moves on guides 40 supported by the bases 1 and by a suitable framework 41 at the end

remote from the shredding mills. At the ends of the machine, the chain passes over sprocket wheels 42 and 43, one of which, 43, is driven in a manner to be presently described, and the lower run moves on a suitable guide 44 supported by the bases 1 and the frame 41. The shaft of the wheels 42 is supported in a carriage 45, which is slidable in an extension frame 46 at the end adjacent to the shredding mills, and the carriage is moved by means of set screws 47, which have lock nuts in connection therewith for holding them in adjusted position. By moving the wheels 42, the tension of the chain may be adjusted.

While the shredded material is being deposited in the lower mold sections, means is provided to form a limiting wall at each side of the chain of molds, the wall moving with the molds. The wall in the present instance (see Fig. 11) is formed by side plates 48 which are connected in an endless chain by links 49. The chain carrying the side plates is mounted to move over an endless path, the upper run of which is below the upper run of the chain of lower mold sections. The arrangement is such that the chain 48-49 of side plates moves upon the guides 40, while the chain of mold sections moves on the chain 48-49, and the side plates are of sufficient length to extend well above the mold sections, as shown in Figures 9 and 11. The endless chain 48-49, is supported by rollers 50 journaled in the frames 41 and 46, and one of the rollers is driven in a manner to be presently described. The lower run of the chain 48-49 is supported by the guides 44 before mentioned, for supporting the lower run of the chain of mold sections. Referring to Figure 11, it will be seen that this guide extends through openings in the bases 1, and the upper run of an endless belt 51 of leather or the like moves upon the guide supporting the chains. The lower run of the chain of mold sections engages the leather belt, and the chain of side plates rests on the chain of mold sections. The belt 51 is supported at its ends by suitable rollers 52, and intermediate its ends on the lower run, by rollers 53. The belt 51 supports and moves with the mold sections, so that the said sections do not contact with the guides, but are supported in their movement thereover. The chain of side plates is shorter than the chain of mold sections, so that the side plates leave the mold sections after the compression of the material into biscuits. A series of upper mold sections 54 is linked together to form an endless chain, and this chain is supported by sprocket wheels 55, with its lower run adjacent to the upper run of the chain of lower sections. The respective wheels are secured on shafts 56 and 57, the shaft 56 being driven in a manner to be presently described, to drive the chain. The shaft 56 is journaled in bearings 58 sup-

ported on the side members of a frame 59, which is mounted to slide longitudinally of the chain of lower mold sections. The side members of the frame are slidable in bearing sleeves 60 supported by the frame 41 and the adjacent base 1. The frame is moved in the bearings by means of a shaft 61 journaled on the end of the frame remote from the shredding mills, and having bevel gear connections 62 with screw rods 63, which are threaded through nuts 64 on the inner faces of the bearings 58 adjacent to the shaft 61. The shaft 61 has a hand wheel 65, and by turning the wheel in the proper direction, the entire chain of upper mold sections may be adjusted longitudinally of the upper run of the chain of lower sections, to correct the setting of the chains should they get out of time or adjustment. The shaft 57 is journaled in arms 66 which are pivoted to the sides of the frame 59, and the upper ends of the arms are connected by a roller 67. A rod 68 engages this roller intermediate its ends, and the other end of the rod is threaded, and passes through a bearing in an arch 69 which connects a pair of links 70, whose ends, adjacent to the arch, are journaled on the shaft 56 before mentioned. A nut 71 is threaded onto the rod adjacent to the arch, and by turning the nut in the proper direction the shaft 57 may be moved toward or from the shaft 56, to tension the chain.

The links 70 before mentioned support a device for moving the lower run of the upper chain into close engagement with the upper run of the lower chain, thereby to mold the biscuits between the mold sections and the side plates, the side plates constituting the ends of the molds. The said device comprises a block 72 which is adjustably connected to a crossbar 73 supported by the links 70 before mentioned intermediate their ends. A hanger 74 is connected to the crossbar by screws 75, and the hanger is connected to the block by set screws 76 having lock nuts as shown. Other set screws 77 are threaded through the hanger into engagement with the block, and by means of the screws 76 and 77 the position of the block with respect to the hanger, may be varied. Means is also provided for adjusting the block with respect to the contacting runs of the chains, that is toward and from the guides 40. A threaded rod 78 is pivoted to the end member of the frame 59 adjacent to the shaft 57, and the rod passes through a bearing 79 connecting the forward ends of the links 70. A nut 80 is threaded onto the rod below the bearing, and a coil spring 81 encircles the rod above the bearing. The upper end of the spring is engaged by a hand wheel 82 threaded onto the rod, and a second wheel 83 is threaded onto the rod above the wheel 82. By means of the nut 80 the position of the adjacent end of the links, and the position of the presser block 72

with respect to the guides 40 may be varied. The spring 81 permits the presser block to yield upwardly in case a hard object should pass between the mold sections. The tension of the spring is adjusted by the hand wheels 82 and 83, the latter serving as a lock to lock the wheel 82 in adjusted position.

The operation of the above described mechanism is as follows—

10 The material shredded by the rolls 2 drops upon the lower mold sections, between the side plates, and as the mold sections travel, the side plates travel therewith, the sections eventually arriving at the position shown in Fig. 9. As the sections pass beneath the shaft 57, the upper mold sections begin to descend between the side plates, and the said sections are gradually moved toward the lower sections, until they engage therewith, beneath the lowest part of the presser block 72. The mold sections cooperate to cut the shreds connecting individual biscuits, the biscuits being formed between the upper and lower sections and the side plates. Referring to Fig. 9, it will be seen that four mold sections and two side plates cooperate for the forming of each biscuit. As the biscuits pass toward the shaft 56, the upper sections begin to lift away from the lower sections, and just before the biscuits pass beneath the shaft 56 the side plates begin to move around the wheels 50 and to move away from the mold sections. Beyond the shaft 56, the biscuits lie on the lower mold sections, in convenient position to be lifted therefrom and transferred to the oven.

The sprocket wheel 43 is mounted on a shaft 84 which is journaled in suitable bearings 85 and 86. A shaft 87 is journaled in bearings 88 at the end of the shaft 84 and in parallelism therewith, and the shafts 84 and 87 are connected by a chain and sprocket connection indicated at 89. The shaft 87 is connected by a sprocket connection indicated at 90 with a Reeves variable transmission indicated generally at 91, and driven by a motor 92, through a sprocket connection 93. The motor 92 drives the chain of lower mold sections through the variable transmission, and the chain of upper sections is driven by a sprocket connection 94 from a shaft 95 which is geared to a shaft 96 by gearing 97. The shaft 96 is journaled on the frame between the runs of the chain of lower mold sections, assists in supporting the upper run of the chain and is driven thereby.

(The oven (see Figs. 1, 2, 4 and 6) consists of a casing 98 of suitable construction and material. An endless conveyor travels through the oven, whose long axis is at right angles to the direction of travel of the biscuit forming mechanism, constituted by the chains of upper and lower mold sections. The conveyor consists of chains 99 connected by transversely extending flights 100, of perforated material, and the chains are supported on the

upper run of the conveyor intermediate the ends of the run by sprocket wheels 101, secured on pipe shafts 102 journaled in bearings 103 in the oven walls. At its ends the conveyor extends beyond the oven, and it is supported in a manner to be presently described. The lower run of the conveyor is supported by rollers 104 journaled in bearings 105 in the oven wall, and the body of the oven is separated from the combustion chamber by a housing 106, which is arranged below the rollers 104, and below the lower run of the conveyor, and which extends upwardly at each side wall in spaced relation, to near the top of the oven, as indicated at 107. The spaces between the extension 107 and the oven walls provide passages for distributing the heat from the combustion chamber into the top of the baking chamber, thus to bake the biscuits from the top down, utilizing the moving heated air, instead of radiant heat.

The combustion chamber is heated in that portion of the oven which is adjacent to the biscuit forming mechanism by a burner 108 of suitable construction, in the present instance a gas burner, the pipes of the burner being arranged beneath the housing 106, which is supported from the bottom of the oven by means of struts 109, the pipes of the burner being arranged between the struts. Gas is supplied to the burner by a supply pipe 110, and an air pipe 111 is provided for supplying the burner with air, the pipes 110 and 111 being valve controlled as shown. A lighter 112 extends the full width of the oven for lighting the burner 108, and the lighter is supplied with gas by a pipe 113, which is also valve controlled. The oven has suitable damper controlled vent flues 114 for removing the vapor and gases. The drying chamber of the oven, which is that portion remote from the biscuit forming mechanism, is heated by steamcoils 115, supplied from a header 116 which is connected with the coils and with a steam line 117. The header also has a drain pipe 118 leading to a steam trap 119. The drying chamber of the oven differs from the puffing chamber in its heating mechanism and in the omission of the brick enclosing walls and the sheet metal extensions 107. The conveyor 99—100 moves continuously through the oven, delivering the completed biscuits at the end remote from the forming mechanism. The oven conveyor moves at right angles to the biscuit forming mechanism, which is also a conveyor, and transferring mechanism is provided for transferring the biscuits from the forming mechanism to the oven conveyor.

The said mechanism (see Figs. 3, 4, 5 and 6) includes a distributing pipe or chamber 120 having a pick-up nozzle or suction head 121 of rectangular outline, and covered on its open or bottom side by a screen 122 of fine

mesh. The area of the open side of the nozzle depends upon the number of biscuits which it is desired to transfer at one time, usually a gross being simultaneously picked up and moved to the flights of the oven conveyor. The head is supported by arms 123 at its ends, the arms being slidably and swingably connected with bracket arms 124 secured to the ends of the chamber 120, a pair of vertically spaced bracket arms being provided at each end of the chamber. Referring to Figs. 12 and 13, it will be noticed that the arm 123 slides through a sleeve 125, which is pivoted between the bracket arms 124 to swing on a vertical axis, and the arm is keyed to the sleeve to permit the sleeve to slide longitudinally thereof, but to prevent relative angular movement of sleeve and arm. Each arm 123 has a transverse bearing 126 intermediate its ends, which is received between arms of a yoke 127, and is pivotally connected thereto as shown. Each yoke has a depending pin 128, which is journaled in a bearing 129 supported by a bracket 130 upstanding from a frame 131 at the front of the oven casing. The arms 123 are thus mounted to swing in a horizontal plane, and in a vertical plane, and the swinging in both directions as well as the movement of the suction head on the arms, is controlled by cams on a shaft 132 journaled transversely on the front of the oven in brackets 133, and driven in a manner to be presently described. (Cams 134 are secured to the shaft near its ends, each cam having a cam surface 135 on its inner face with which cooperates a roller 136 journaled on the adjacent end of the arm 123. When the roller engages the elevated surface of the cam, the arms are swung into the dotted line position of Fig. 12, carrying with them the suction head. In picking up biscuits from the forming means, the swinging movement of the arms above mentioned enables the suction head to travel with the forming mechanism during the picking up of the biscuits; and the arms are then swung in a vertical plane to slightly elevate the suction head, so that it will not interfere with the lines of oncoming biscuits. The vertical swinging is brought about by barrel cams 137 on the shaft 132, a cam 137 being arranged adjacent to each cam 134. The adjacent end of each arm 123 has a fork 138 at the cam 137, and the arms of the fork engage above and below the cam. The barrel cam has a depressed portion as shown in Fig. 13 which when the suction head is in position to pick up biscuits from the forming mechanism will register with the lower fork arm, and the suction head will be permitted to drop slightly to engage the biscuits, and will be immediately raised, to move the picked up biscuits far enough above the forming mechanism to prevent interference with the oncoming biscuits. The suction head is moved to-

ward and from the oven, to deposit the picked up biscuits on the flights of the oven conveyor, by means of the cams 134. A crank arm 139 is arranged at each end of the suction head, each arm being pivoted at one end to the brackets 124, and at the other to a wrist pin 140 on the cam. The crank arms have bearings 141 and 142 which engage the bracket and wrist pin respectively, and the body of the crank arm is hinged to the bearings as shown in Fig. 12, to swing on vertical axes, so that there is no interference with the swinging movement of the suction head. The arms 123 are connected in rear of the brackets 130 and are constrained to swing together by a cross-rod 143, which is pivoted at its ends to the arms, adjacent to the forks 138. The shaft 132 is driven from the shaft 84 before mentioned. A shaft 144 is journaled in the framework 181 adjacent to the furnace wall, and the shaft is connected to the shaft 84 by bevel gearing 145. The ends of the oven conveyor which extend beyond the ends of the oven casing, are supported by sprocket wheels on shafts 146 and 147 respectively, the former being at the rear of the furnace, while the latter is at the front, being supported by the frame 131. Other shafts 148 and 149 are journaled in the frame between the shafts 144 and 147, the four shafts 144, 147, 148 and 149 being in the same horizontal plane. The shafts 144 and 148 are connected by gears 150 and 151, the former being on the shaft 144, while the latter is on the shaft 148. The shafts 148 and 149 are connected by gears 152 and 153, the former being on the shaft 148, while the latter is on the shaft 149. The shafts 149 and 147 are connected by gears 154 and 155, the former being on the shaft 149, while the latter is on the shaft 147. The shaft 156 is journaled in the brackets 130 before mentioned, directly above the shaft 149, and it carries a gear 157 meshing with the gear 155 on the shaft 147. A train of gears 158 connects the shaft 156 with the shaft 132. Thus both conveyors, the forming mechanism being in effect a conveyor, and the cam shaft for controlling the suction head, which is a transferring mechanism, are driven by the same motor 92.

The distribution chamber 120 has connected therewith a plenum chamber 159 having an inlet 160 which is connected by a flexible connection 161 with an elbow 162. The elbow which is supported by springs 163 communicates by means of a second elbow 164 with a valve casing 165, which in turn is connected with the inlet of a suction fan 166 supported on the furnace casing, and driven by a motor 167 through a belt connection 168. Within the valve casing (Figs. 5, 14 and 15) is arranged a series of valves, in the form of shutters arranged to overlap, to close communication through the chamber, or to be moved into parallelism, to open the chamber.

Each valve comprises a shaft 169 journaled in opposite walls of the casing, and having secured thereto within the casing a shutter leaf 170. In the present instance the shutter leaves are hollow bodies, diamond shaped in cross-section, the shaft extending through the body at the center thereof and being secured thereto. Each shaft is provided with a pinion 171 outside the casing, and all of the pinions are engaged by a rack bar 172 having guided movement on the side wall of the casing, as shown in Fig. 14. The lower end of the rack bar is linked to one end of a lever 173 pivoted intermediate its ends, and connected at its opposite end by a link 174 with one end of a cam lever 175 pivoted on the oven casing, and having at the opposite end from the link a friction roller engaging the periphery of the cam 134. This cam has on its periphery a cam surface or elevated portion 176, which when the suction head is above the forming mechanism will operate the lever 175 to open the valves in the valve casing, to connect the suction head with the exhausting mechanism. The valves will be held open by the cam, until the suction head is above the oven conveyor, when the roller passes off the elevated portion of the cam, and a counter-weight 177 returns the valves to closed position. The lever 173 is supported by a pillar 178 or other suitable support. The upper run of the chain or lower mold sections, which is of considerable length, is supported intermediate its ends by sprocket wheels 179 on the shaft 96 before mentioned, and in order to prevent disengagement of the chain from the sprocket wheels at this point, an electromagnet 18 is arranged below the chain, the pole of the magnet being directly beneath the chain.

The operation of the improved machine is as follows:—

A suitable cereal is fed to the shredding machine, and formed into shreds by the shredding rolls 2. The shreds are scraped from the rolls by the scrapers 15, and deposited on the upper run of the chain of lower mold sections 39, the side plates 48 at this time being in place at opposite sides of the chain, to hold the material from overflowing. As the mold sections move away from the shredding mills, they come beneath the upper mold sections 54, which are gradually superposed thereon, forming the shreds into biscuits with the co-operation of the side plates, and separating the adjacent biscuits from each other. When the upper mold sections lift from contact with the lower sections, the biscuits lying on the lower sections are moved along to the transferring mechanism 120. At regular intervals, the suction head 121 is moved above the chain of lower mold sections 39, and a plurality of biscuits is lifted from the chain. The suction head swings with the chain of mold sections during a portion of its travel, so that there is no interference with the oncoming biscuits,

and as the biscuits held by the suction head are lifted above the level of the biscuits on the forming chain, the head is moved toward the oven conveyor, and the biscuits are dropped thereon. The air valves 170 are opened when the suction head engages the biscuits on the forming chain, to connect the head with the source of fluid pressure, and the valves are closed when the suction head is above the flights of the oven conveyor, so that the biscuits are dropped thereon. At the proper speed, the biscuits are moved through the puffing and drying ovens, and emerge from the end of the oven remote from the forming chain in finished condition. The movement of all of the parts is coordinated, so that they operate in the proper relation with respect to each other to continuously produce finished biscuits when in operation.

The shaft 87 may be connected to the shaft 84, or disconnected therefrom, by means of a clutch indicated at 180. The clutch is operated from the shredding mill end of the machine, by means of a handle 181 pivoted at its lower end to a fixed support, and connected intermediate its ends to one end of a lever 182, pivoted on the frame 41. The other end of the lever 182 is connected by a link 183, with one end of a lever 184 pivoted on the frame 131. The other end of the lever 184 is pivoted to the body of a fork 185, whose arms engage the clutch and the body of the fork is pivoted to a fixed support. By means of the handle 181, the clutch may be operated to connect or disconnect the shafts 84 and 87.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claim is intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a machine of the class described, in combination, shredding mechanism, moving means to receive the shredded material and mold it into biscuits comprising upper and lower mold sections cooperating with each other to mold said material by pressure, the pressure being applied solely by said sections, an oven, a conveyor for transporting the biscuits through the oven, and means for transferring the biscuits from the molding means

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intermediate the ends of the range of travel of said moving means to the conveyor.

2. In a machine of the class described, in combination, shredding mechanism, means for removing shredded material from said mechanism, means for forming biscuits from said material, comprising endless chains of upper and lower mold sections having runs thereof adjacent to which said material is delivered, means for supporting and moving each chain, adjustable means for coordinating the movement of the chains to cause the sections of one chain to register with those of the other on the adjacent runs, means for imparting relative movement toward and from each other to the adjacent runs, and means for bodily moving one chain at will to correct the adjustment of the chains.

3. In a machine of the class described, in combination, mechanism for forming biscuits including an endless chain of bottom mold sections, and a second endless chain of substantially flat plates forming walls at opposite sides only of the mold sections during the filling thereof.

4. In a machine of the class described, in combination, mechanism for forming biscuits, including an endless chain of bottom mold sections, shredding mechanism delivering to the sections, and means comprising an endless chain of substantially flat plates cooperating with said sections to form walls solely at the sides of the chain to prevent overflow of the shredded material, and to assist in molding the material during travel of the sections.

5. In a machine of the class described, in combination, mechanism for forming biscuits, including an endless chain of mold sections, a second chain composed of flat side plates, and means for moving the chains to cause the first chain to ride upon the second chain between the plates during a portion of the travel of the sections.

6. In a machine of the class described, in combination, mechanism for forming biscuits, including lower mold sections, and upper mold sections, each section being formed of a plurality of parts, means for moving the upper and lower sections over endless paths with the upper sections above the lower sections during a portion of their travel, means comprising flat plates movable in endless paths, to form mold completing walls at opposite sides of the lower sections during the early portion of their travel adjacent to the upper sections, means to retain said walls in position until the biscuit is formed and means controlled by the movement of the upper sections for pressing them toward the lower sections.

7. In a machine of the class described, in combination, upper and lower mold sections, means for moving the sections over endless paths with the upper sections above the low-

er sections during a portion of their travel, means for feeding material to the lower sections prior to their arrival below the upper sections, mold completing side walls for said mold sections movable independently of said mold sections, and means to position said walls at opposite sides of the lower sections while they are being filled and during the early portion of their travel beneath the upper sections.

8. In a machine of the class described, in combination, cooperating top, bottom and side mold sections for forming biscuits, means for moving the sections over endless paths with the sections adjacent during a portion of their travel, means controlled by the movement of the sections for gradually moving them together during the said portion of their travel, and adjustable means for coordinating the movement of the top and bottom sections to cause them to register when they are moved together, and means to vary the tension on said top mold sections.

9. In a machine of the class described, in combination, upper and lower mold sections, means for moving the sections over endless paths with the upper sections above the lower sections during a portion of their travel, and manually adjustable means controlled by the movement of the sections for gradually moving the sections into contact during the said portion of their travel, and a frame in which said upper mold sections are mounted, and means to vary the position of said frame thereby to vary the position of said upper sections relative to said lower sections.

10. In a machine of the class described, in combination, molds for forming the biscuits including upper and lower sections concave from side to side and adapted to contact at their opposite sides, and side plates engaging the ends only of the sections to close and complete the molds.

11. In a machine of the class described, in combination, molds for forming biscuits composed of upper and lower sections mounted to move over endless paths with the upper sections above the lower sections during a portion of their travel, said sections being concave from front to rear, and means moving with the sections when they are superposed and engaging the opposite sides only thereof to close and complete the molds.

12. In a machine of the class described, in combination, molds for forming biscuits composed of upper and lower sections mounted to move over endless paths with the upper sections above the lower sections during a portion of their travel, said sections being concave from front to rear, means controlled by the movement of the sections for moving them into contact while the upper sections are above the lower sections, and means moving with the sections during the said portion

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of their travel and engaging opposite sides only of the sections to close and complete the ends of the molds.

13. In a machine of the class described, in combination, shredding mechanism, a series of molds formed of sections, said molds being divided intermediate their ends, means for moving the molds past the shredding mechanism in succession, and means controlled by the movement of the molds for successively assembling the sections to form open containers for receiving material and to afterwards close the molds to mold the material into biscuits.

14. In a machine of the class described, in combination, shredding mechanism, a series of molds formed of sections, said molds being divided intermediate their ends, means for moving the molds past the shredding mechanism in succession, and means controlled by the movement of the sections for successively assembling the sections to form open containers and closed molds, and for afterwards disassembling the sections to expose the molded biscuits.

15. In a machine of the class described, in combination, shredding mechanism, a series of molds formed of sections, said molds being divided intermediate their ends, means for moving the molds past the shredding mechanism in succession, means controlled by the movement of the sections for successively assembling the sections to form open containers and closed molds, and for afterwards disassembling the sections to expose the molded biscuits, and means for removing the biscuits.

16. In a machine of the class described, in combination, shredding mechanism, a series of molds formed of sections, said molds being divided intermediate their ends, means for moving the molds past the shredding mechanism in succession, means controlled by the movement of the sections for successively assembling the sections to form open containers and closed molds and for afterwards disassembling the sections to expose the molded biscuits, an oven, and means for removing the biscuits and transporting them through the oven.

17. In a machine of the class described, in combination, shredding mechanism, molding mechanism and an oven, a conveyor for said molding mechanism, and a conveyor for said oven, said conveyors movable continuously in directions at substantially right angles to each other, and means movable with each conveyor over a portion of its travel and at substantially the same speed for transferring the articles from the mold conveyor to the oven conveyor.

18. In a machine of the class described, in combination, shredding mechanism, molding mechanism, and an oven, a conveyor for said molding mechanism and a conveyor for said

oven, said conveyors movable continuously in directions transverse to each other, means movable along the line of travel of the mold conveyor during a portion of its movement and along the line of travel of the oven conveyor during a subsequent portion of its movement, for picking up articles from the mold conveyor and transferring the articles to the oven conveyor.

19. In a machine of the class described, in combination, shredding mechanism, molding mechanism, and an oven, a conveyor for said molding mechanism and a conveyor for said oven, said conveyors movable continuously in directions transverse to each other, and means independent of said conveyors for picking up articles from the mold conveyor and transferring the articles to the oven conveyor, said means movable with the first conveyor during a portion of its travel.

20. In a machine of the class described, in combination, shredding mechanism, molding mechanism, and an oven, a conveyor for said molding mechanism and a conveyor for said oven, said conveyor movable continuously in directions transverse to each other, and means for picking up the articles from the mold conveyor and transferring the articles to the oven conveyor, said means movable with the first conveyor during a portion of its travel, and toward and from the conveyor to pick up and transfer the articles.

21. In a machine of the class described, in combination, shredding mechanism, molding mechanism, and an oven, a conveyor for said molding mechanism and a conveyor for said oven, said conveyors movable continuously in directions transverse to each other, means for picking up articles from the mold conveyor and transferring the articles to the oven conveyor, including a pick-up device, and means for moving the said device in the direction of movement of one of the conveyors during a portion of its travel and at the same speed.

22. In a machine of the class described, in combination, shredding mechanism, molding mechanism, and an oven, a conveyor for said molding mechanism and a conveyor for said oven, said conveyors movable continuously in directions transverse to each other, means for picking up articles from the mold conveyor and transferring the articles to the oven conveyor, including a suction head movable between the conveyors, means for moving the head in the direction of travel of the first conveyor during the picking up of the articles, and means synchronized with the movement of the head between the conveyors for controlling the suction.

23. In a machine of the class described, in combination, shredding mechanism, molding mechanism, and an oven, a conveyor for said molding mechanism and a conveyor for said oven, said conveyors, adapted to travel at right angles to each other, and means for

picking up articles from the mold conveyor, transferring same laterally thereof, and depositing them on the oven conveyor.

24. In a machine of the class described, in combination, shredding mechanism, molding mechanism, and an oven, a conveyor for said molding mechanism, and a conveyor for said oven, said conveyors, adapted to travel at right angles to each other, means for picking up articles from the mold conveyor and depositing them on the oven conveyor, including a pick-up device movable between the conveyors for the articles, and means for moving the said device in the direction of travel of the first conveyor and at the same speed.

25. In a machine of the class described, in combination, molding mechanism, including a conveyor therefor, baking mechanism including an oven and a conveyor therefor, a pick-up device, arms for supporting the device, means for swinging the arms laterally, and means for moving the device longitudinally of the arms, whereby said device will cooperate with each of said conveyors in turn.

26. In a machine of the class described, in combination, molding mechanism, including a conveyor therefor, baking mechanism including an oven and a conveyor therefor, a pick-up device, arms for supporting the device, means for swinging the arms laterally, means for moving the device longitudinally of the arms, and means for swinging the arms vertically to raise and lower the device, whereby said device will cooperate with each of said conveyors in turn.

27. In a machine of the class described, in combination, molding mechanism, including a conveyor therefor, baking mechanism including an oven and a conveyor therefor, a pick-up device including a suction head, arms for supporting the head, means for swinging the arms laterally and vertically, and means for moving the head longitudinally of the arms, whereby said device will cooperate with each of said conveyors in turn.

28. In a machine of the class described, in combination, molding mechanism, including a conveyor therefor, baking mechanism including an oven and a conveyor therefor, a pick-up device including a suction head, arms for supporting the head, means for swinging the arms laterally and vertically, means for moving the head longitudinally of the arms, and means controlled in coordination with the movement of the arms for controlling the pressure in the head, whereby said device will cooperate with each of said conveyors in turn.

29. In a machine of the class described, in combination, molding mechanism, including a conveyor therefor, baking mechanism including an oven and a conveyor therefor, a pick-up device, arms pivoted intermediate their ends for supporting the device, a plurality of means for swinging the arms in horizontal and vertical planes, and for sliding the

device on the arms, and means for coordinating the operations of the several means, whereby said device will cooperate with each of said conveyors in turn.

30. In a machine of the class described, in combination, shredding mechanism, means for molding the shredded material into biscuits, comprising a chain of upper mold sections, a chain of lower mold sections, and a chain of end mold plates, each mold being formed by adjacent ends of the upper mold sections, adjacent ends of the lower mold sections and said plates.

31. In a machine of the class described, in combination, shredding mechanism, means for molding the shredded material into biscuits, comprising a chain of upper mold sections each having a transverse abutment intermediate its ends, a chain of lower mold sections each having a transverse abutment intermediate its ends, and a chain of end mold plates, each mold being formed by adjacent ends of the upper mold sections, adjacent ends of the lower mold sections and said plates, the molds extending from the abutments of one set of sections to the abutments of the adjacent set.

32. In a machine of the class described, in combination, a series of molds each composed of a plurality of upper mold sections, a plurality of lower mold sections, and a plurality of end plates, and means for supporting and moving the corresponding sections of all of the molds over endless paths lying adjacent during a portion of their travel, and means controlled by the movement of the sections for assembling the sections during a portion of such travel, and for afterwards disassembling the sections to expose the molded biscuit.

33. In a machine of the class described, in combination, molding mechanism comprising a series of sectional molds, the sections of which move in endless paths, each mold being formed from eight parts, comprising two upper sections, two lower sections, and two plates at each end of said upper and lower sections.

34. In a machine of the class described, in combination, molding mechanism comprising a series of upper mold sections, a series of lower mold sections, and a series of end mold sections, said sections being movable through endless paths, the molds being formed by the cooperation of adjacent halves of the upper mold sections with adjacent halves of the lower mold sections.

35. In a machine of the class described, in combination, shredding mechanism, a series of molds formed of a plurality of sections, means for moving a portion of the molds past the shredding mechanism in succession, and means controlled by the movement of the molds for successively assembling the sections to form open containers for receiving

ing material and to afterwards close the molds to mold the material into biscuits, said sections each forming a portion of two adjacent molds.

36. In a machine of the class described, in combination, means for forming biscuits, comprising lower mold sections to which the shreds are delivered, upper mold sections, means for moving the sections along converging paths, and means for coordinating the movement of the sections to cause the upper sections to register with the lower sections during a portion of their travel, comprising a frame in which said upper mold sections are mounted and an adjusting member effective to move said frame and all of said upper mold sections longitudinally of said lower mold sections.

37. In a machine of the class described in combination, means for forming biscuits, comprising lower mold sections to which the shreds are delivered, a chain of upper mold sections, means for moving the sections along converging paths, means for coordinating the movement of the sections to cause the chain of upper sections to register with the lower sections during a portion of their travel, comprising a frame in which said chain of upper mold sections are mounted and an adjusting member effective to move said frame and all of said upper mold sections longitudinally of said lower mold sections, and means to vary the tension on said chain.

38. In a machine of the class described, in combination, means for forming biscuits, comprising lower mold sections to which the shreds are delivered, upper mold sections, means for moving the sections along converging paths, means for coordinating the movement of the sections to cause the upper sections to register with the lower sections during a portion of their travel, comprising a frame in which said upper mold sections are mounted and an adjusting member effective to move said frame and all of said upper mold sections longitudinally of said lower mold sections, and means for imparting relative movement to the sections toward and from each other when they are in register.

39. In a machine of the class described, in combination, means for forming biscuits, comprising lower mold sections, to which the shreds are delivered, a chain of upper mold sections, means for moving the sections along converging paths, means for coordinating the movement of the sections to cause the chain of upper sections to register with the lower sections during a portion of their travel, comprising a frame in which said chain of upper mold sections is mounted and an adjusting member effective to move said frame and all of said upper mold sections longitudinally of said lower mold sections, means for imparting relative movement to the sections toward and from each other when they are in

register, and means to vary the tension on said chain.

40. In a machine of the class described, in combination, means for forming biscuits comprising chains of upper and lower mold sections, means for moving the chains of sections over endless paths with the upper section above the lower section during a portion of their travel, and means for coordinating the movement of the sections to cause the sections to register when they are adjacent, comprising a frame in which said upper mold sections are mounted and an adjusting member effective to move said frame and all of said upper mold sections longitudinally of said chain of lower mold sections, and means for imparting relative movement of the sections toward and from each other when they are in register.

41. In a machine of the class described, in combination, means for forming biscuits comprising chains of upper and lower mold sections, means for moving the chains of sections over endless paths with the upper section above the lower section during a portion of their travel, means for coordinating the movement of the sections to cause the sections to register when they are adjacent, comprising a frame in which said upper mold sections are mounted and an adjusting member effective to move said frame and all of said upper mold sections longitudinally of said chain of lower mold sections, means for imparting relative movement to the sections toward and from each other when they are in register, and means to vary the tension of said upper chain.

42. In a machine of the class described, in combination, means for forming biscuits, comprising chains of upper and lower mold sections, means for moving the chains of sections over endless paths with the upper section above the lower section during a portion of their travel, means for coordinating the movement of the sections to cause the sections to register when they are adjacent, comprising a frame in which said upper mold sections are mounted and an adjusting member effective to move said frame and all of said upper mold sections longitudinally of said chain of lower mold sections, and means for imparting relative movement from and toward each other to the adjacent runs.

43. In a machine of the class described, in combination, means for forming biscuits, comprising chains of upper and lower mold sections, means for moving the chains of sections over endless paths with the upper section above the lower section during a portion of their travel, means for coordinating the movement of the sections to cause the sections to register when they are adjacent, comprising a frame in which said upper mold sections are mounted and an adjusting member effective to move said frame and all of said upper

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mold sections longitudinally of said chain of lower mold sections, means for imparting relative movement from said toward each other to the adjacent runs, and means to vary the tension of said upper chain.

In testimony whereof I affix my signature

JOHN LEONARD KELLOGG.

O. A. HANFORD.
PACKAGING MACHINE.
APPLICATION FILED JAN. 12, 1913.

1,091,509.

Patented Mar. 31, 1914.

8 SHEETS-SHEET 1.

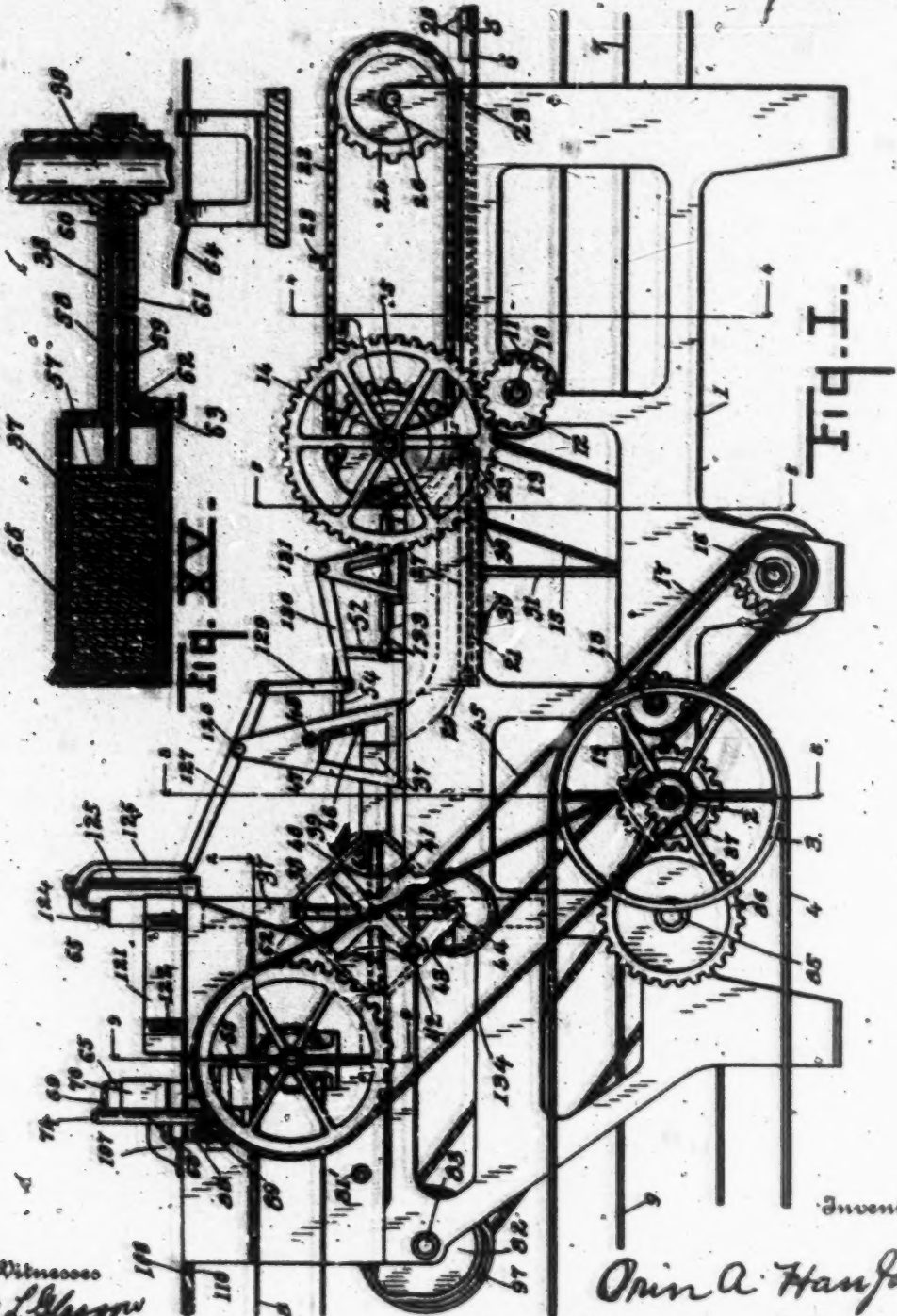


Fig. I.

Fig. XV.

Witnesses
M. L. Glasgow
M. O. Woodruff

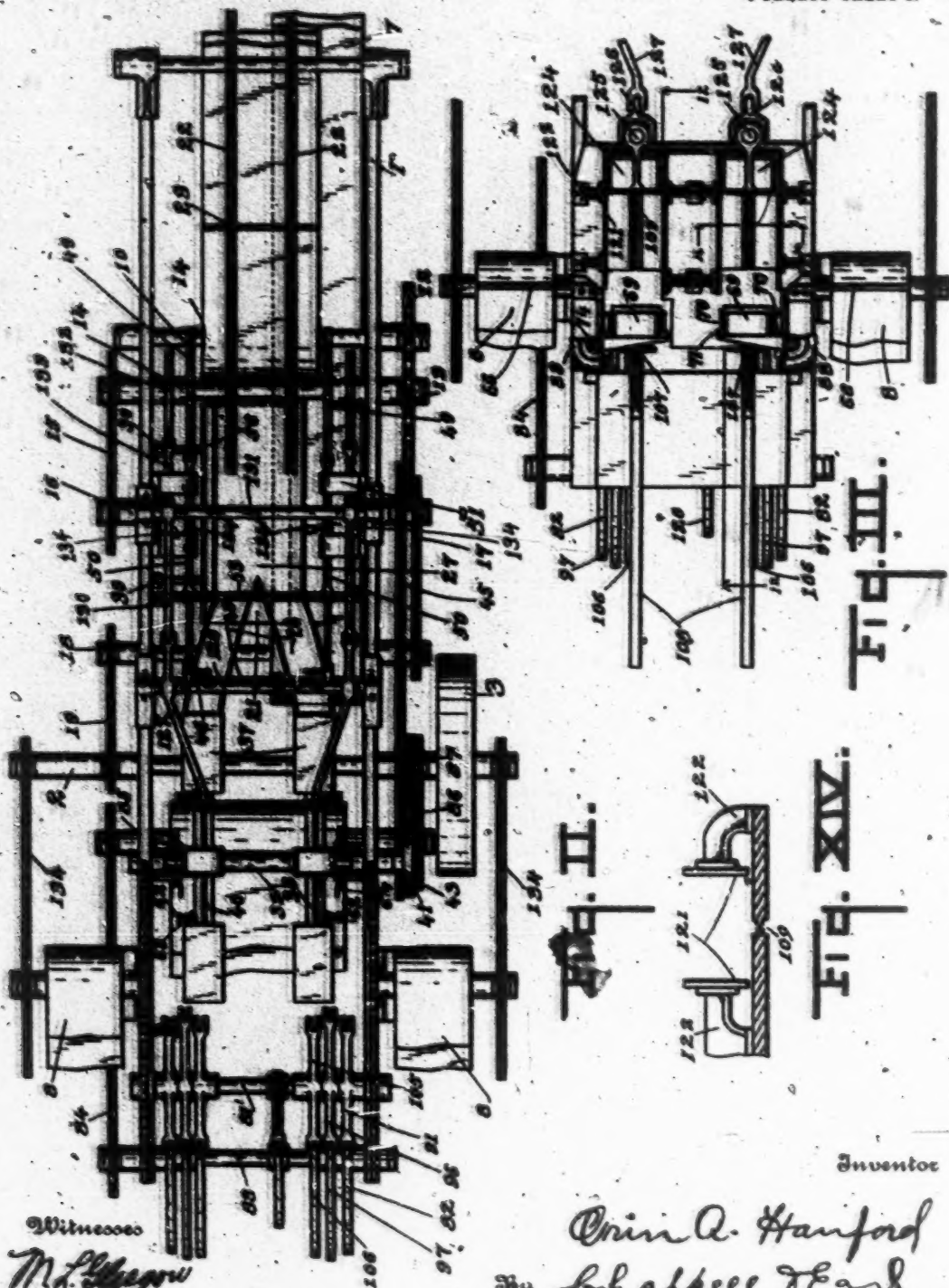
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5 SHEETS-SHEET 1.



Witnesses
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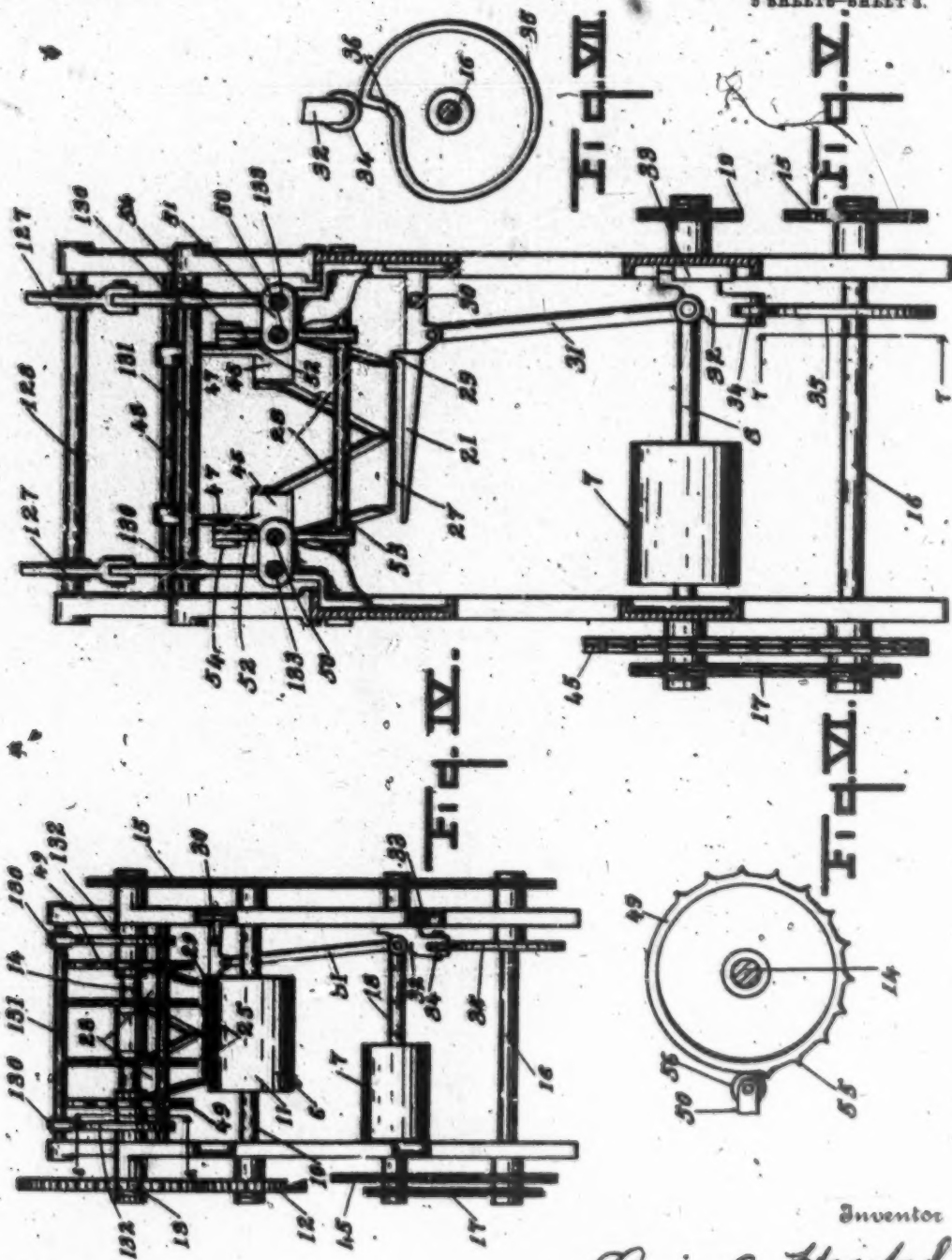
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5 SHEETS-SHEET 3.



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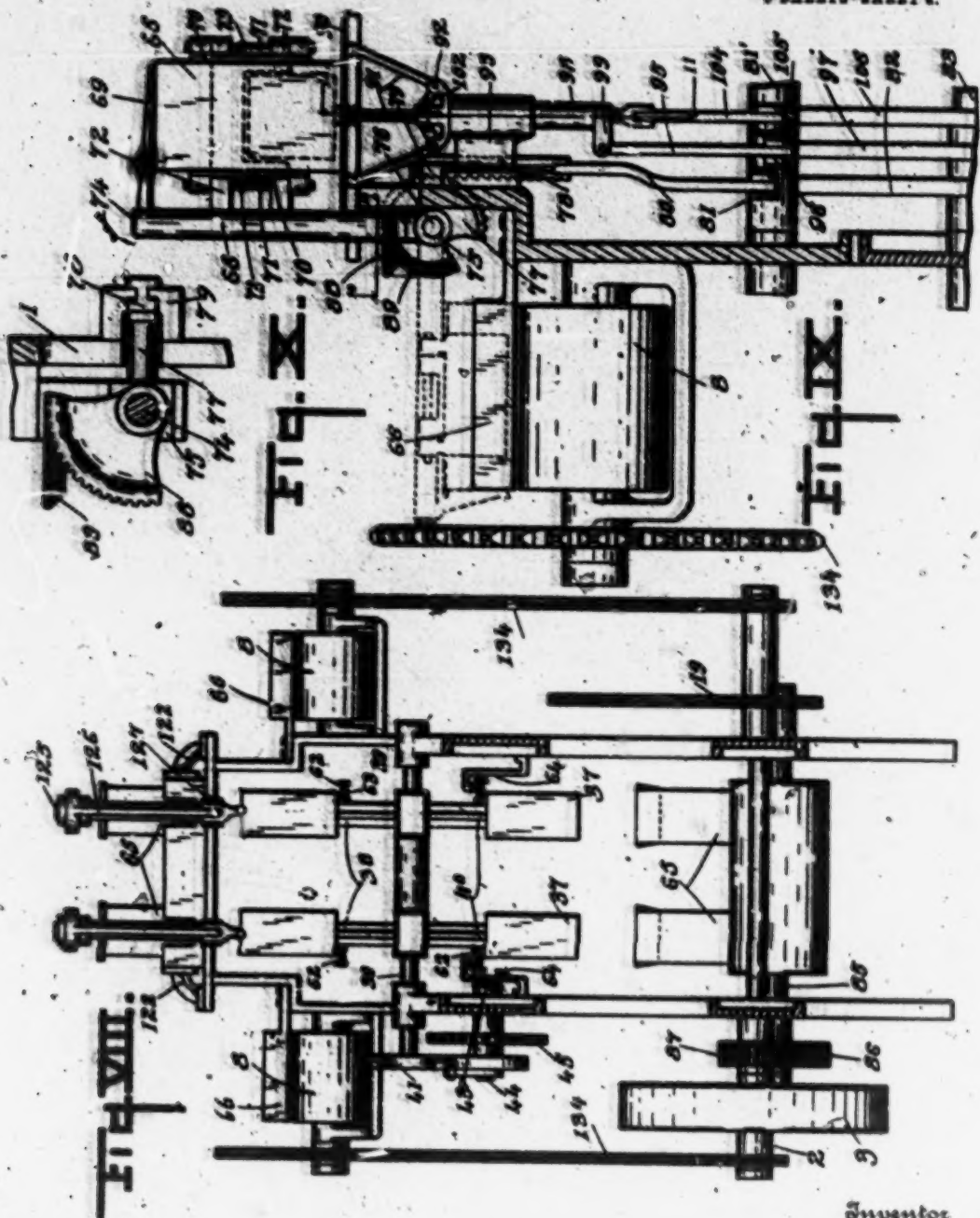
Witnesses
M. L. Glasgow
M. P. Woodruff

O. A. HANFORD.
PEELING MACHINE.
APPLICATION FILED JAN. 13, 1913.

1,091,509.

Patented Mar. 31, 1914.

5 SHEETS-SHEET 4.



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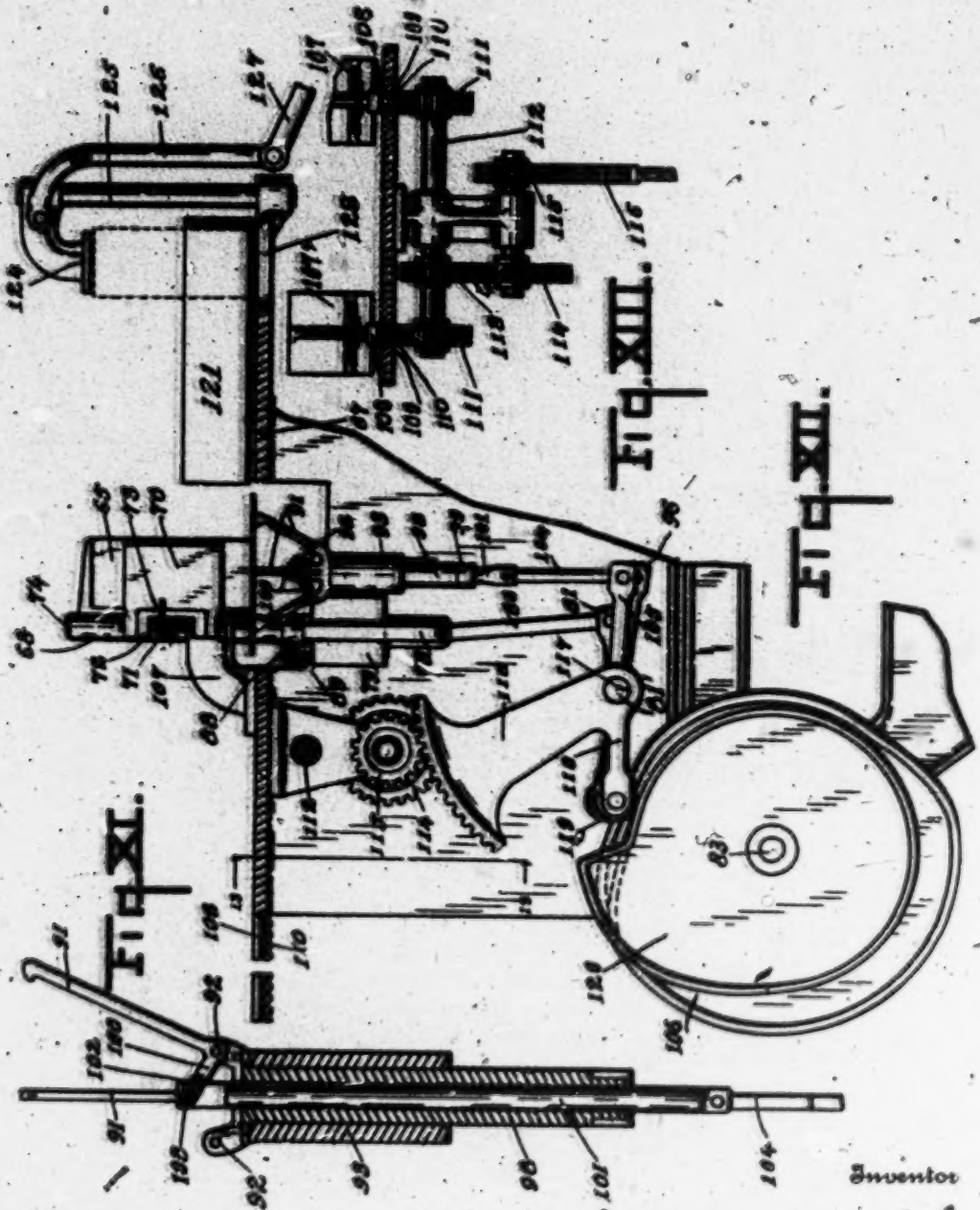
Inventor
Omar A. Hanford
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Attorney

O. A. HANFORD.
PACKAGING MACHINE.
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6 SHEETS—SHEET 4.



Witnesses
M. L. Glasgow
M. P. Woodruff

324 Miss A. Hanford
Chappell Hall

Attorneys

UNITED STATES PATENT OFFICE.

ORIN A. HANFORD, OF ROCHESTER, NEW YORK, ASSIGNOR TO JOHN L. KELLOGG, OF
BATTLE CREEK, MICHIGAN.

PACKAGING MACHINE.

1,091,509.

Specification of Letters Patent. Patented Mar. 31, 1914.

Application filed January 13, 1913. Serial No. 741,702.

To all whom it may concern:

Be it known that I, ORIN A. HANFORD, a citizen of the United States, residing at Rochester, New York, have invented certain new and useful Improvements in Packaging-Machines, of which the following is a specification.

This invention relates to improvements in packaging machines.

The main objects of this invention are, first, to provide an improved packaging machine by which articles of the character of shredded wheat biscuits or other articles of a more or less friable nature may be effectively packed without injury thereto. Second, to provide an improved packaging machine which is automatic in its operations and of large capacity. Third, to provide in a structure of the class described, improved carton feeding means. Fourth, to provide in a structure of the class described, an improved means for filling and discharging the filled cartons. Fourth, to provide an apparatus of the class described, which is comparatively simple in structure and not likely to get out of repair.

Further objects, and objects relating to structural details, will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure which is a preferred embodiment of my invention is clearly illustrated in the accompanying drawing forming a part of this specification, in which:

Figure I is a side elevation of a structure embodying the features of my invention, the outer ends of the several conveyers being broken away. Fig. II is a plan view partially in horizontal section, on a line corresponding to line 2—2 of Fig. I. Fig. III is a detail plan view of the carton feeding mechanism, the parts removed by the sectioning in Fig. II being here shown. Fig. IV is a transverse vertical section on a line corresponding to line 4—4 of Fig. I, showing details of the article feeding mechanism. Fig. V is a vertical transverse section on a line corresponding to line 5—5 of Fig. I, showing further details of the article feeding mechanism. Fig. VI is a detail vertical section on a line corresponding to line 6—6

of Fig. IV, showing the packer actuating cam 49. Fig. VII is a detail vertical section on a line corresponding to line 7—7 of Fig. V showing the table actuating cam 35. Fig. VIII is a detail vertical transverse section on a line corresponding to line 8—8 of Fig. I, showing features of the holders and cartons feeding mechanism. Fig. IX is a detail vertical transverse section on a line corresponding to line 9—9 of Fig. I, showing details of the carton feeding mechanism. Fig. X is a detail horizontal section on a line corresponding to line 10—10 of Fig. IX. Fig. XI is a detail vertical section on a line corresponding to line 11—11 of Fig. IX, showing details of the carton flap spreading mechanism. Fig. XII is a detail vertical longitudinal section on a line corresponding to the broken line 12—12 of Fig. III, showing further details of the carton feeding mechanism. Fig. XIII is a detail vertical transverse section on a line corresponding to line 13—13 of Fig. XII. Fig. XIV is a detail vertical transverse section on a line corresponding to line 14—14 of Fig. III showing details of the carton feed table. Fig. XV is a detail section on a line corresponding to line 15—15 of Fig. I, showing details of the packing mechanism and the means for discharging the cartons.

In the drawing similar reference characters refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the little arrows at the ends of the section lines.

Referring to the drawing, the frame 1 is shown mainly in conventional form and may be of any desired construction to properly support the parts and their driving connections.

The driving shaft 2 is driven by the pulley 3 and the driving belt 4. The articles to be packaged are conveyed to the machine on trays 5 by the conveyer or feed belt 6. The trays are returned or discharged from the machine by the conveyer 7. The empty cartons are carried into the machine by the conveyers 8 while the filled cartons are carried from or discharged from the machine by the conveyer 9. The outer ends of these conveyers are not illustrated as the means for delivering the filled trays to the conveyers 6 or the unsealed cartons to the conveyers 8 or for handling the filled cartons form no part of this invention. In practice, the filled

cartons are preferably delivered to the conveyers 8 from a suitable bottom sealer and from the conveyer 9 to a top sealer.

The conveyer 6 is driven by the shaft 10 provided with a suitable roller or pulley 11. The shaft 10 is connected by the gears 12 and 13 to a shaft 14. The shaft 14 is connected by the sprocket chain 15 to a shaft 16 disposed toward the bottom of the frame. The shaft 16 is connected by the sprocket chain 17 to a shaft 18 extending across the frame. The shaft 18 is in turn connected on the opposite side of the machine by the sprocket chain 19 to the driving shaft 2. The several sprocket wheels are not designated by numerals as their arrangement will be readily understood. Other parts are driven through this connection as will appear as the description proceeds.

The trays 3 are provided with flanges 20 on their longitudinal edges. The trays are delivered from the feed conveyer 6 onto the table 21 by a mechanism consisting of the sprocket chains 22 having flight-like pusher bars 23 mounted thereon. The sprocket chains 22 are supported to travel above and parallel with the inner end of the conveyer 6 by means of sprocket wheels 24 and 25 carried by a shaft 26 and the shaft 14 respectively, the sprockets 25 being the driving sprockets. As the flights or pushers 23 are carried along by the sprocket chains, they engage the rear ends of the trays 3 and push them from the inner end of the conveyer 6 onto the table 21. As the trays are pushed onto this table, the biscuits or other articles to be packaged, carried by the trays, are picked up by the scoop or pick-up 27 which is disposed above the table and in proper spaced relation thereto so that the tray passes under the scoop and the articles onto it. The structure illustrated, is designed for simultaneously filling two series of cartons.

The scoop is provided with diverging chutes 28 at its rear end. See Figs. II, IV, and V. The scoop is flanged at its edges to retain and guide the articles thereon. The structure illustrated, is especially designed for the packaging of shredded cereal biscuits which are placed on the trays in two rows. The trays are in practice preferably baking trays so that the biscuits are packaged direct from the ovens without handling. The flights or pushers 23 engaging the rear ends of the trays, serve to support the biscuits as well as to carry the trays along so that the biscuits are delivered onto the scoop as described.

The table 21 is provided with a guide flange 29 at one side. This table 21 is pivoted at 30 and is supported in its operative position by means of the link 31 mounted on the slide 32. This slide 32 travels in the vertical slide-way 33 as shown in Fig. V.

As the structural details of this slide and slide-way are not a part of this invention they are not here shown. The slide 32 is provided with a roller 34 traveling on the cam 35 on the shaft 16. As the cam revolves, the roller 34 drops into the low point 36 of the cam, allowing the table to tilt or swing down on its pivot, discharging the empty tray onto the tray return conveyer 7. This operation is timed and the cam is shaped so that the table is swung up to operative position to receive the succeeding tray. The articles are delivered from the chutes 28 into the holders or packing receptacles 37. These holders or receptacles 37 are carried by arms 38 radially mounted on the shaft 39, the structure illustrated being provided with a double series of four holders each.

The arms 38 carrying the holders, are connected by braces 40. See Fig. I. The shaft 39 is driven intermittently through a Geneva stop gear 41 on the shaft 39 and the coacting gear 42 and arm 43 on the shaft 44. The shaft 44 is connected by the sprocket chain 45 to the shaft 16 which is driven through the connections previously pointed out. As the details of the driving connections for the shaft 44 to the holder carrying shaft 39 do not form a part of this present invention, I do not describe the same with further detail herein, the object of this type of driving connection being to drive the shaft 39 with a step by step movement properly timed to bring the holders 37 into position to receive the articles as they are delivered from the chutes 28.

The articles are delivered from the chutes 28 into the holders by the packers 46 supported on the arms 47 on the rock shaft 48 extending across the frame above the chutes. The packers 46 are actuated from the cams 49 on the shaft 14. The cams 49 act upon the reciprocating rods 50 supported in suitable bearings in the brackets 51. The rods 50 are connected to levers 52 on the shaft 53, the levers being connected by the links 54 to the arms 47 of the packers. The cams 49 are provided with a plurality of cam projections 55, (see Fig. VI), there being twelve of these projections on the cams of structure illustrated, so that each package contains twelve articles. The rods 50 are provided with rollers 56 traveling on the cams.

To support the articles in proper position as they are being packed in the holders 37, and also to eject them into the cartons and the cartons from the holders, I provide the holders with plungers 57 supported by the stems 58 reciprocating in suitable sleeves 59 within the holder carrying arms 38. The plungers are yieldingly supported by the coiled springs 60 arranged within the sleeves. The plungers are provided with racks 61 with which the pawls 62 coact. See

Fig. XV. These pawls 62 are provided with actuating springs 63. As the articles are packed into the holders by the packers 46, the plungers are forced inwardly against the tension of the springs 60 and are retained by the pawls until released by the pawl trips 64 which are positioned to act after the cartons have been slipped over the holders so that the articles are delivered into the cartons. This step in the cycle of operations of the machine will be again referred to in its proper sequence.

The shaft 39, is, as stated, actuated with a step by step movement, each step being a quarter revolution of the shaft. From the filling position, the holders are actuated to a vertical position to receive the cartons 65 which are slipped over the holders.

The cartons are, as stated, conveyed to the machine by the conveyers 8, the cartons being arranged on the conveyers on their sides with their open ends facing inwardly. The conveyers 8 are driven through the sprocket chains 134 connecting them to the shaft 2. The cartons are carried by the conveyers 8 against the stops 66. From these conveyers 8 the cartons 65 are delivered or shifted onto the feed table 67 which projects forwardly so that the holders 37 swing under its forward end when they are brought to the vertical position from their filling position.

The carton shifter members 68 are provided with fixed fingers 69 at their outer ends adapted to engage the outer ends of the cartons and pivoted plate-like clamping fingers 70 adapted to engage opposite sides thereof. The clamping fingers or plates 70 are mounted on the pivots 71 on the arm 72 on the member 68. Springs 73 support the clamping fingers 70. The member 68 is arranged upon a spindle 74 carried by an oscillating member 75 mounted on the shaft 76. The oscillating member 75 is provided with a segment 77 which is actuated by the rack 78 arranged in a vertically disposed slide bearing member 79, see Fig. IX. The rack 78 is connected by the link 80 to the lever 81 mounted on the shaft 81' extending transversely across the frame. The lever 81 is actuated by the cam 82 on the shaft 83. This shaft 83 is connected by the sprocket chain 84 to the shaft 85 which is connected by the gears 86 and 87 to the driving shaft 2, the sprocket chain being arranged on one side of the frame and the gears on the opposite. This driving connection for the oscillating member 75 swings it from a horizontal position shown by dotted lines in Fig. IX, to the vertical position shown therein.

To rock the member 68 from its carton engaging or picking up position as shown by dotted lines in Fig. IX, to its delivery position, as shown by full lines, it is provided

with a segmental gear 88 coacting with a fixed segmental rack 89. It will be obvious that with the segment 88 in engagement with the rack, when the member is swung from its vertical to its horizontal position or vice versa, it is oscillated. The cartons are inverted by this shifter and carried into position to be delivered onto the table 67. To effectively deliver the cartons to the table the flaps 90 thereof are spread out to a horizontal position, as shown in Fig. IX. The flap spreading or opening fingers 91 are pivoted at 92 on the vertically adjustable member 98. This member 98 is mounted for vertical movement in the bracket 93. The member 98 is connected by the link 95 to the lever 96 mounted on the shaft 81', the lever being actuated by a cam 97 on the shaft 83. The member 98 is connected to the link 95 by means of the clip 99 on the lower end of member 98. To spread and collapse the fingers, the inwardly projecting arms 100 thereof are connected to the rod 101 reciprocating in the member 98. See Fig. XI. The arms 100 are slotted at 102 to engage pins 103 on the reciprocating rod 101. The rod 101 is connected by the link 104 to the lever 105 on the shaft 81' actuated by the cam 106 on the shaft 83. By thus arranging the parts, the spreader is first actuated to carry the spreader fingers up within the flaps by the upward movement of the member 98 which is accomplished through the connection described. The fingers are then spread by the upward movement of the rod 101 which is accomplished through its connection described, the movements being properly timed through their driving connections. The cartons are pushed from this position shown in Fig. XII, that is, after the flaps have been spread or bent to a horizontal position onto the table 67. The feed members 107 by which this is accomplished are carried by the slides 108 arranged in suitable ways 109 provided therefor in the table. See Figs. XII, XIII, and XIV. These slides 108 are provided with racks 110 on their under sides, which are driven through the pinions 111 on the shaft 112 arranged below the table. The shaft 112 is driven through the train of gears 113, 114, 115, and the oscillating segment 116 which meshes with the gear 115. The segment 116 is pivoted at 117 on shaft 81'. The segment is provided with an arm 118 having a roller 119 thereon traveling on the cam 120. The table 67 is provided with guides 121 for the cartons, the guides being supported on overhanging arms 122 so that the lower edges of the guides 121 are spaced from the table to permit the flaps to project under the guides. The table 67 is provided with openings 123 at its forward end to which the cartons are delivered through the holders 37.

I have described only one shifter mecha-

nism, one flap spreader mechanism, and one carton feeder, as the other is a duplicate mechanism. The operating connections for the shifter and flap spreader mechanism are duplicate. The two feed or pusher members 107 are actuated through the single cam 120.

The cartons are supported in position above the openings 122 in the feed table by their flaps. From this position, they are pushed through the opening and over the holders 37 by the members 124 mounted to reciprocate on the vertical rods 125 carried by the table 67.

The delivery members 124 are connected by the links 126 to the levers 127 mounted on the transverse shaft 128. These levers are in turn connected by the links 129 to the bent levers 130 mounted on the transverse shaft 131. The bent levers 130 are actuated from the cams 132 acting on the rods 133 arranged to reciprocate in suitable bearings in the brackets 51. The springs 134 on the rods 50 return the packer fingers. The springs 134 on the rods 133 return the plungers to their initial position. As stated, the holders 37 are swung under the openings 122 in the feed table in which position the cartons are pushed over the holders by the members 124. The cartons are then carried by the holders around to the lower position above the delivery conveyer 9 in which position, the trips 64 act upon the pawls 63 releasing the plungers 57 so that the articles in the holders are pushed out or ejected into the cartons which are simultaneously pushed off the holders and onto the conveyer 9. The next actuation brings the emptied holder into position to receive the articles. This completes the cycle of movements of the machine, which are the delivery of articles to be packaged on suitable trays as 5 on the conveyer 6; the transfer of the trays from the conveyer 6 onto the table 21 during which time the articles are picked up 45 from the trays by the scoop 27 and pushed along thereon up the chutes 28 to the packers 46; the discharge of the empty trays from the table 21 onto the return conveyer 7; the delivery of the empty cartons on the conveyers 8, shifting therefrom to the feed table and spreading the flaps and feeding the cartons to the members 124 by which they are pushed onto the holders; the discharge of the charged holders into the cartons as the same are pushed from the holders and the delivery of the filled cartons from the machine by the conveyer 9.

My improved packaging machine is entirely automatic in its operation. The cartons are effectively delivered so that they are not distorted or injured and articles such as described are effectively packaged without injury thereto.

I have illustrated and described my improvements with considerable detail in the

embodiment illustrated. I have not attempted to illustrate or describe various modifications which I contemplate as being possible and practical as such modifications will undoubtedly be readily understood by those skilled in the art to which this invention relates. I desire, however, to be understood as claiming my improvements specifically in the form illustrated as well as broadly within the scope of the appended claims.

Having thus described my invention, what I claim is new and desire to secure by Letters Patent is:

1. In a structure of the class described, the combination with a delivery chute; a shaft; holders open at their outer ends and disposed radially on said shaft; means for rotating said shaft with a step by step movement whereby the holders are successively brought to a horizontal position at the rear end of said chute; a packer oscillating above the rear end of said chute to push the articles into said holders; plungers within said holders; springs by which said plungers are yieldingly supported, said plungers being provided with ratchet bars; pawls coacting therewith whereby said plungers are retained in their depressed position as the holders are filled; means for feeding cartons arranged to deliver the cartons over the holders when the holders are in their upright position; and means for tripping said pawls when the holders are in their inverted position whereby the articles are ejected from the holders into the cartons as the cartons slip from the holders to the delivery conveyer.

2. In a structure of the class described, the combination with a delivery chute; a shaft; holders open at their outer ends and disposed radially on said shaft; means for rotating said shaft with a step by step movement whereby the holders are successively brought to a horizontal position at the rear end of said chute; a packer oscillating above the rear end of said chute to push the articles into said holders; and means for feeding cartons arranged to deliver the cartons over the holders when the holders are in their upright position; the articles dropping from the holders into the cartons as the cartons slip from the holders while in an inverted position, all coacting for the purpose specified.

3. In a structure of the class described, the combination of a feed mechanism; a shaft; holders open at their outer ends and radially disposed on said shaft; means for rotating said shaft with a step by step movement whereby the holders are successively brought to filling position; plungers within said holders; springs by which said plungers are yieldingly supported, said plungers being provided with ratchet bars; pawls coacting therewith whereby said plungers are

retained in their depressed position as the holders are filled; means for feeding cartons arranged to deliver the cartons over the holders when the holders are in their upright position; a delivery conveyer disposed below said shaft; and means for tripping said plunger pawls when the holders are in their inverted position above said delivery conveyer whereby the material is ejected from the holders into the cartons as the cartons slip from the holders.

4. In a structure of the class described, the combination of a shaft; holders open at their outer ends and radially disposed on said shaft; means for rotating said shaft with a step by step movement whereby the holders are successively brought to filling position; a feed mechanism adapted to deliver to the holders while the holders are in their filling position; spring actuated plungers within said holders; detents for said plungers; means for feeding cartons arranged to deliver the cartons over the holders when the holders are in their upright position and means for releasing said plunger detents, all coacting for the purpose specified.

5. In a structure of the class described, the combination with the feeding means comprising a delivery chute; a shaft; holders open at their outer ends and radially disposed on said shaft; means for rotating said shaft with a step by step movement whereby the holders are successively brought to a horizontal position at the end of said chute; a packer oscillating above the rear end of said chute to push the material into said holders; plungers within said holders; springs by which said plungers are yieldingly supported, said plungers being provided with ratchet bars; pawls coacting therewith whereby said plungers are retained in their depressed position as the holders are filled; means for feeding cartons arranged to deliver the cartons over the holders after they are filled; and means for tripping said pawls whereby the material is ejected from the holders into the cartons.

6. In a structure of the class described, the combination with the feeding means comprising a delivery chute; a shaft; holders open at their outer ends and radially disposed on said shaft; means for rotating said shaft with a step by step movement whereby the holders are successively brought to a horizontal position at the end of said chute; a packer oscillating above the rear end of said chute to push the material into said holders; and means for feeding cartons arranged to deliver the cartons over the holders after they are filled.

7. In a structure of the class described, the combination of holders open at their outer ends; a holder filling means; means for actuating said holders with a step by

step movement whereby they are successively brought to filling position; plungers within said holders; springs by which said plungers are yieldingly supported, said plungers being provided with ratchet bars; pawls coacting therewith whereby said plungers are retained in their depressed position as the holders are filled; a carton feed means arranged to deliver cartons over the holders after the holders are filled; and means for tripping said plunger pawls whereby the material is ejected from the holders into the cartons as the cartons are removed from the holders.

8. In a structure of the class described, the combination of holders open at their outer ends; a holder filling means; means for actuating said holders with a step by step movement whereby they are successively brought to filling position; spring actuated plungers within said holders; detents for said plungers; a carton feed means arranged to deliver cartons over the holders after the holders are filled, and means for tripping said plunger detents, all coacting for the purpose specified.

9. In a structure of the class described, the combination of holders open at their outer ends; a holder filling means; means for actuating said holders with a step by step movement whereby they are successively brought to filling position; spring plungers within said holders, said plungers being depressed and retained in their depressed positions as the holders are filled; means for delivering cartons over the holders after the holders are filled; and means for releasing said plungers whereby the material is ejected from the holders into the cartons as the cartons are removed from the holders.

10. In a structure of the class described, the combination of a carton feed conveyer; a carton stop above said conveyer; a shifter member provided with a fixed finger at its outer end adapted to engage the ends of the cartons and pivoted clamping fingers adapted to engage their sides; an oscillating shifter member support having a spindle for said shifter member; a segment on said support; a reciprocating rack coacting with said segment; a segment on said shifter member; and a fixed rack coacting therewith whereby the shifter member is oscillated on its spindle as the spindle is oscillated to and from its horizontal and vertical positions.

11. In a structure of the class described, the combination of a feed table; a carton feed conveyer arranged at the side of said table, the cartons being delivered by said conveyer on their sides with their open ends toward the table; a shifter member provided with carton engaging fingers; an oscillating shifter member; means for oscillating said

shifter member on its support as the support is oscillated to and from its horizontal and vertical positions; a flap spreader comprising a vertically reciprocating finger member, fingers pivotally mounted thereon to swing radially, said fingers being provided with inwardly projecting slotted arms; a reciprocating rod having pins thereon engaging said slotted arms of said fingers; means for reciprocating said finger member and said rod timed so that the finger member is actuated to introduce the fingers between the flaps and the rod actuated whereby the flaps are spread to a horizontal position; and a reciprocating feed member adapted to push the cartons from the shifter member to the table.

12. In a structure of the class described, the combination of a feed table; a carton feed conveyer arranged at the side of said table, the cartons being delivered by said conveyer on their sides with their open ends toward the table; a shifter member provided with carton engaging fingers, an oscillating shifter member support; means for oscillating said shifter member on its support as the support is oscillated to and from its horizontal and vertical positions; and a reciprocating feed member adapted to push the cartons from the shifter member to the table.

13. In a structure of the class described, the combination of a feed table having a delivery opening therein; a carton feed mechanism comprising means for supporting the cartons in an inverted position; a flap spreader comprising a vertically reciprocating finger member, fingers pivotally mounted thereon to swing radially; reciprocating rod connected to said fingers; means for reciprocating said finger member and said rod timed so that the finger member is actuated to introduce the fingers into the flaps and the fingers spread to swing the flaps to a horizontal position; a reciprocating feed member adapted to push the cartons from said supporting member across the table to delivery position; carton guides supported in a spaced relation to the feed table to permit the flaps to project thereunder as the cartons travel along on the table to delivery position said cartons being supported in delivery position above the delivery opening by their flaps; carton holders actuated with a step by step movement to bring them under the delivery opening of the table; and a vertically reciprocating member for delivering the cartons from the table to the holders.

14. In a structure of the class described, the combination of a feed table having a delivery opening therein; a carton feed mechanism comprising means for supporting the cartons in an inverted position; a flap spreader, a reciprocating feed member adapted to push the cartons from said supporting member across the table to delivery

position; carton guides supported in a spaced relation to the feed table to permit the flaps to project thereunder as the cartons travel along on the table to delivery position, said cartons being supported in delivery position above the delivery opening by their flaps; carton holders actuated with a step by step movement to bring them under the delivery opening of the table; and a vertically reciprocating member for delivering the cartons from the table to the holders.

15. In a structure of the class described, the combination of a feed table having a delivery opening therein; a carton feed mechanism comprising means for supporting the cartons in an inverted position; a flap spreader comprising a vertically reciprocating finger member, fingers pivotally mounted thereon to swing radially; a reciprocating rod connected to said fingers; means for reciprocating said finger member and said rod timed so that the finger member is actuated to introduce the fingers into the flaps and the fingers spread to swing the flaps to a horizontal position; a reciprocating feed member adapted to push the cartons from said supporting member across the table to delivery position; said cartons being supported in delivery position above the delivery opening by their flaps; carton holders actuated with a step by step movement to bring them under the delivery opening of the table; and a vertically reciprocating member for delivering the cartons from the table to the holders.

16. In a structure of the class described, the combination of a feed table having a delivery opening therein; a carton feed mechanism comprising means for supporting the cartons in an inverted position; a flap spreader; a reciprocating feed member adapted to push the cartons from said supporting member across the table to delivery position, said cartons being supported in delivery position above the delivery opening by their flaps; carton holders actuated with a step by step movement to bring them under the delivery opening of the table; and a vertically reciprocating member for delivering the cartons from the table to the holders.

17. In a structure of the class described, the combination of a feed table; a carton feed conveyer arranged at the side of said table, the cartons being delivered by said conveyer on their sides with their open ends toward the table; a shifter member provided with carton engaging fingers; an oscillating shifter member support; means for oscillating said shifter member on its support as the support is oscillated to and from its horizontal and vertical positions; a flap spreader and a reciprocating feed member adapted to push the cartons from the shifter member to the table.

18. In a structure of the class described,

the combination of a feed table; a carton feed conveyer arranged at the side of said table, the cartons being delivered by said conveyer on their sides with their open ends toward the table; a shifter member provided with carton engaging fingers; an oscillating shifter member support; and means for oscillating said shifter member on its support as the support is oscillated to and from its horizontal and vertical positions.

19. In a structure of the class described, the combination of a feed table; a carton feed conveyer; a shifter member provided with carton engaging fingers; means for actuating said member to pick up the cartons from the feed conveyer and support them in an inverted position; a flap spreader adapted to spread the flaps to a horizontal position while supported by said shifter member; a feed member adapted to push the cartons from the shifter member across the table to delivery position; guides supported in a spaced relation to the table to permit the flaps to project thereunder as the cartons are pushed to delivery position; carton holders; and a member for delivering cartons from the table to the holder.

20. In a structure of the class described, the combination of a feed table; a carton feed conveyer; a shifter member provided with carton engaging fingers; means for actuating said member to pick up the cartons from the feed conveyer and support them in an inverted position; a flap spreader adapted to spread the flaps to a horizontal position while supported by said shifter member; and a feed member adapted to push the cartons from the shifter member to the table.

21. In a structure of the class described, comprising a table means for supporting the cartons in an inverted position; a flap spreader comprising a vertically reciprocating finger member, fingers pivotally mounted thereon to swing radially, said fingers being provided with inwardly projecting slotted arms; a reciprocating rod having pins thereon engaging said slotted arms of said fingers; means for reciprocating said finger member and said rod timed so that

the finger member is actuated to introduce the fingers between the flaps and the fingers spread to swing the flaps to a horizontal position; and a reciprocating feed member adapted to push the cartons from said supporting member to the table.

22. In a structure of the class described, the combination of a feed table having a delivery opening therein; a carton feed mechanism comprising means for supporting the cartons in an inverted position; a flap spreader adapted to spread the flaps to a horizontal position while the cartons are so supported; a feed member adapted to push the cartons from the said supporting means across the table to delivery position; guides supported in a spaced relation to the table to permit the flaps to project thereunder as the cartons are pushed to delivery position, the cartons being supported in delivery position by their flaps; and a reciprocating member for delivering the cartons.

23. In a structure of the class described, the combination of a feed table having a delivery opening therein; a carton feed mechanism comprising means for supporting the cartons in an inverted position; a flap spreader adapted to spread the flaps to a horizontal position while the cartons are so supported; a feed member adapted to push the cartons from the said supporting means across the table to delivery position; and a reciprocating member for delivering the cartons.

24. In a structure of the class described, the combination of a feed table, a carton feed mechanism comprising means for supporting the cartons in an inverted position; a flap spreader adapted to spread the flaps to a horizontal position while the cartons are so supported; and a feed member adapted to deliver the cartons from said supporting means to the table.

In witness whereof, I have hereunto set my hand and seal in the presence of two witnesses.

ORIN A. HANFORD. [L.S.]

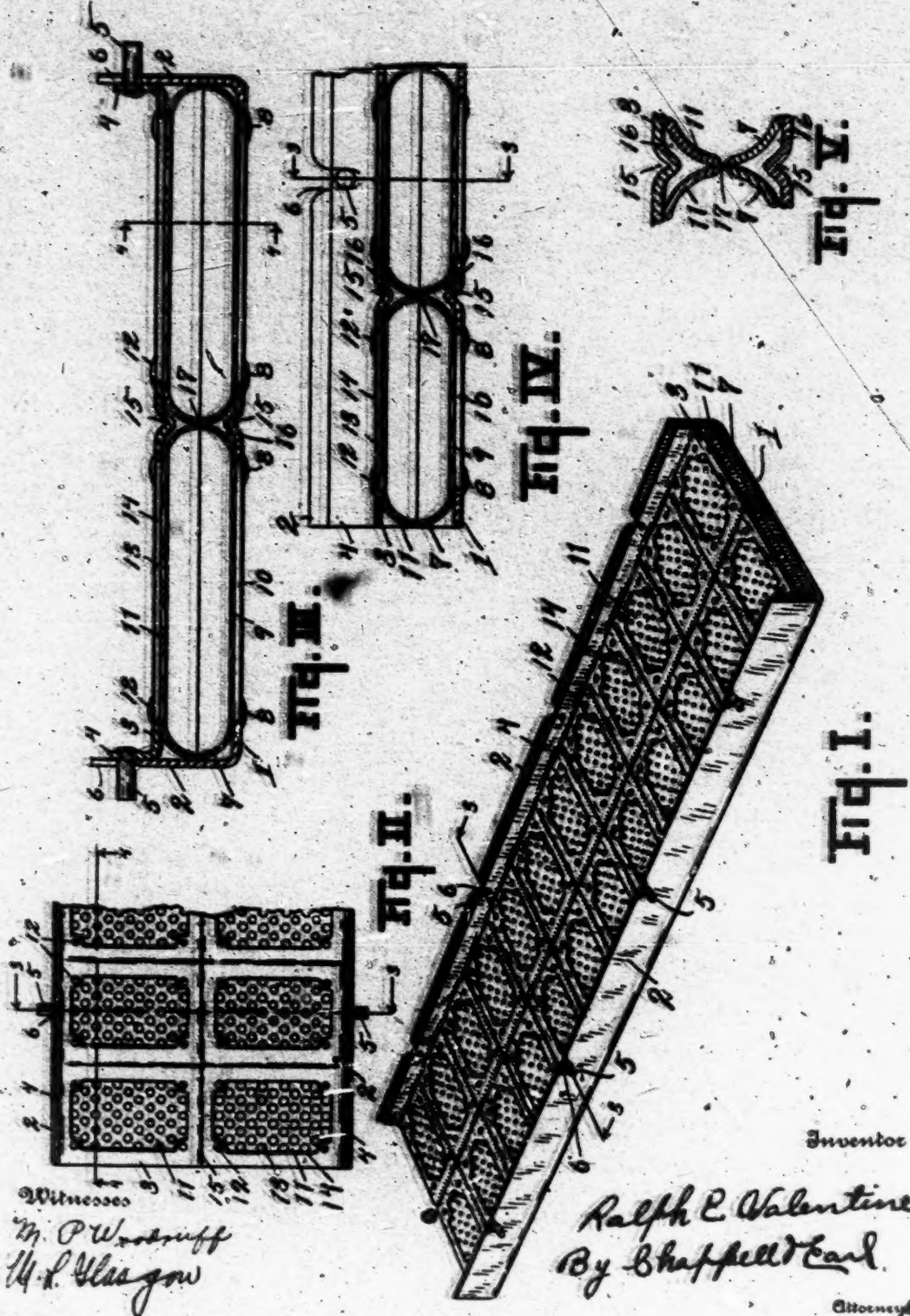
Witnesses:

HERBERT L. LAZELERE,
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R. E. VALENTINE.
BAKING PAN AND MOLD FOR BISCUITS.
 APPLICATION FILED JAN. 24, 1912.

1,124,363.

Patented Jan. 12, 1915.



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BAKING-PAN AND MOLD FOR BISCUITS.

1,124,363.

Specification of Letters Patent.

Patented Jan. 12, 1915.

Application filed January 24, 1912. Serial No. 673,214.

To all whom it may concern:

Be it known that I, RALPH E. VALENTINE, a citizen of the United States, residing at Battle Creek, Michigan, have invented certain new and useful Improvements in Baking-Pans and Molds for Biscuits, of which the following is a specification.

This invention relates to improvements in baking pans and molds for biscuits, particularly biscuits like shredded wheat or biscuits made from flaked cereals and the like.

The objects of this invention are: first, to provide a baking tray or mold in which the biscuits are cut and molded and retained in the forms during the baking process and with means for securing even baking without scorching or excessive browning of the edges of the biscuits. Second, to provide improved means of insuring register of the parts together so that the biscuits will be molded accurately without waste of material, the mass of which is distributed within the pan.

Further objects, and objects relating to details and economies of construction and operation will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification. The invention is clearly defined and pointed out in the claims.

A structure constituting the preferred embodiment of my invention is fully illustrated in the accompanying drawing, forming a part of this specification, in which:

Figure I is a perspective view of a pan and mold embodying the features of my invention. Fig. II is a detail plan view of one end thereof. Fig. III is an enlarged detail sectional view taken on a line corresponding to line 3—3 of Figs. I, II, and IV, showing details of the pan part and the devices for clamping and securing the registering of the mold whereby the biscuits are properly cut from the material introduced into this pan or tray. Fig. IV is a detail longitudinal sectional view taken on a line corresponding to line 4—4 of Figs. II and III. Fig. V is an enlarged detail sectional view through the sides or edges of adjacent molds and the pan showing the form of the cutting edges and the protection of the molds from undue heat.

In the drawing, the sectional views are taken looking in the direction of the little arrows at the ends of the section lines, and similar numerals of reference refer to similar parts throughout the several views.

Referring to the numbered parts of the drawing, the tray 1 has vertical side flanges 2. The tray cover 3 is similarly formed with upturned vertical flanges 4 that fit closely between the side flanges 2 of the tray. Laterally extending register pins 5—5 are disposed at intervals on the side flanges 4 and fit into registering notches 6 in the vertical flanges 2 of the tray 1.

Disposed in the tray 1 are half biscuit molds 7, which are rectangular in form and are secured in place by rivets 8, (see particularly Figs. III, IV and V). These bottom molds are perforated to permit the ready escape of moisture and the penetration of heat and are disposed over apertures 10 in the tray so that there is only a thin layer of perforated sheet metal incasing the under side of the biscuit, which allows the heat to penetrate very readily and evenly brown the biscuit.

Exactly corresponding half molds 11 are secured to the under side of the tray cover 3 by suitable rivets 12—12. These upper half molds are perforated at 13, and the tray cover 3 is apertured at 14 so that there is but a thin layer of perforated sheet metal embracing the top side of the biscuit, which allows the heat to penetrate and brown at that point as well.

The precise form of the cutting edges 17 of the molds appears in Fig. V where it will be noted that the cutting edges of the molds are beveled on the inside and that the cutting edges of adjacent molds substantially coincide and the cut off dough or shredded or flaked mass is forced within the mold.

The tray 1 and the tray cover 3 are creased at 15—15 between the biscuit molds to strengthen the frame work and also to effectively locate and support the biscuit molds which are attached to the said tray and its cover and form an inclosed air space 16 between the molds. By this arrangement, the molds also serve as cutters for the dough or material which is to be molded and baked and by distributing a mass of material, such as shredded wheat or flakes in the tray and

then inserting the cover 3 and forcing it to place, owing to the registering means, the damp dough will be cut off and there will be no wastage to take care of, the entire mass being properly formed into biscuits within the various molds.

The biscuits can be entirely baked in these molds as they can very readily aerate, or, if desired, after the same have become partially baked and set, the cover can be removed and the material be allowed to expand freely. It is very desirable, however, to preserve the biscuits exactly in form, and the correct amount of dough or prepared material is distributed in the tray 1 before the cover is shut down to cut the same and confine it within the molds. Where the biscuits are baked within the molds, undue browning of the thin edges is avoided by the inclosed air space 10.

Having thus described my invention, I desire to state that I have produced my improved baking pans and molds in the preferred form. However, I realize that they can be considerably modified in details and secure very satisfactory results without departing from my invention.

I desire to claim the invention specifically as illustrated, and also broadly as pointed out in the claims appended hereto.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination in a baking pan and mold, of a tray with vertical flanged sides, with register notches therein, with apertures in the bottom thereof for receiving individual molds, a tray cover corresponding thereto with upturned flanged sides fitting within the tray sides with laterally extending register pins corresponding to the notches in the tray sides, also with apertures corresponding to those in the tray, half molds of perforated metal with their cutting edges in proximity to each other, rectangular in form entirely filling the said tray, with cutting edges beveled on the inner side of the upper edge, suitably disposed over apertures therein and secured thereto, and corresponding half molds of perforated metal on the under side of the tray cover suitably disposed beneath apertures in the said tray cover and secured thereto, the said tray and cover being suitably creased between said molds to reinforce and strengthen the same and form confined air spaces therebetween: all coacting substantially as described and for the purpose specified.

2. The combination in a baking pan and mold, of a tray with vertical flanged sides, with register notches therein, with apertures in the bottom thereof for receiving individual molds, a tray cover corresponding thereto with upturned flanged sides fitting

within the tray sides with laterally extending register pins corresponding to the notches in the tray sides, also with apertures corresponding to those in the tray, half molds of perforated metal provided with cutting edges in proximity to each other, rectangular in form entirely filling the said tray, suitably disposed over apertures therein and secured thereto, and corresponding half molds of perforated metal on the under side of the tray cover suitably disposed beneath apertures in the said tray cover and secured thereto, the said tray and cover being suitably creased between said molds to reinforce and strengthen the same, all coacting substantially as described and for the purpose specified.

3. The combination in a baking pan and mold, of a tray with vertical flanged sides with register notches therein, with apertures in the bottom thereof for receiving individual molds, a tray cover corresponding thereto with upturned flanged sides fitting within the tray sides with laterally extending register pins corresponding to the notches in the tray sides, also with apertures corresponding to those in the tray, half molds of metal provided with cutting edges in proximity to each other, rectangular in form entirely filling the said tray and secured thereto, and corresponding half molds of metal on the under side of the tray cover suitably disposed beneath said tray cover and secured thereto, all coacting substantially as described and for the purpose specified.

4. The combination in a baking pan and mold, of a tray with vertical flanged sides with register devices, and with apertures in the bottom thereof for receiving individual molds, a tray cover corresponding thereto with upturned flanged sides fitting within the tray sides with register devices, also with apertures corresponding to those in the tray, half molds of metal provided with cutting edges in proximity to each other, rectangular in form entirely filling the said tray and secured thereto, and corresponding half molds of metal on the under side of the tray cover suitably disposed beneath said tray cover and secured thereto, all coacting substantially as described and for the purpose specified.

5. The combination in a baking pan and mold, of a tray with a series of half molds therein provided with suitable registering devices, and with cutting edges in proximity to each other, the said half molds entirely filling the said tray, and a tray cover with half molds secured to the under side thereof, corresponding to the tray with its half molds, provided with cooperating registering devices, as specified.

6. The combination in a baking pan and mold, of a tray with a series of half molds

therein entirely filling the said tray, and my hand and seal in the presence of two provided with cutting edges in proximity witnesses.
to each other; and a tray cover with half
molds secured to the under side thereof,
corresponding to the tray with its half
molds, as specified.

RALPH E. VALENTINE. [L.s.]

Witnesses:

FRANK J. HEATH,
FRANK A. FOSTER.

In witness whereof, I have hereunto set

418

R. E. VALENTINE.
OVEN.

APPLICATION FILED JAN. 24, 1912.

Patented June 15, 1915.

6 SHEETS—SHEET 1.

1,148,151.

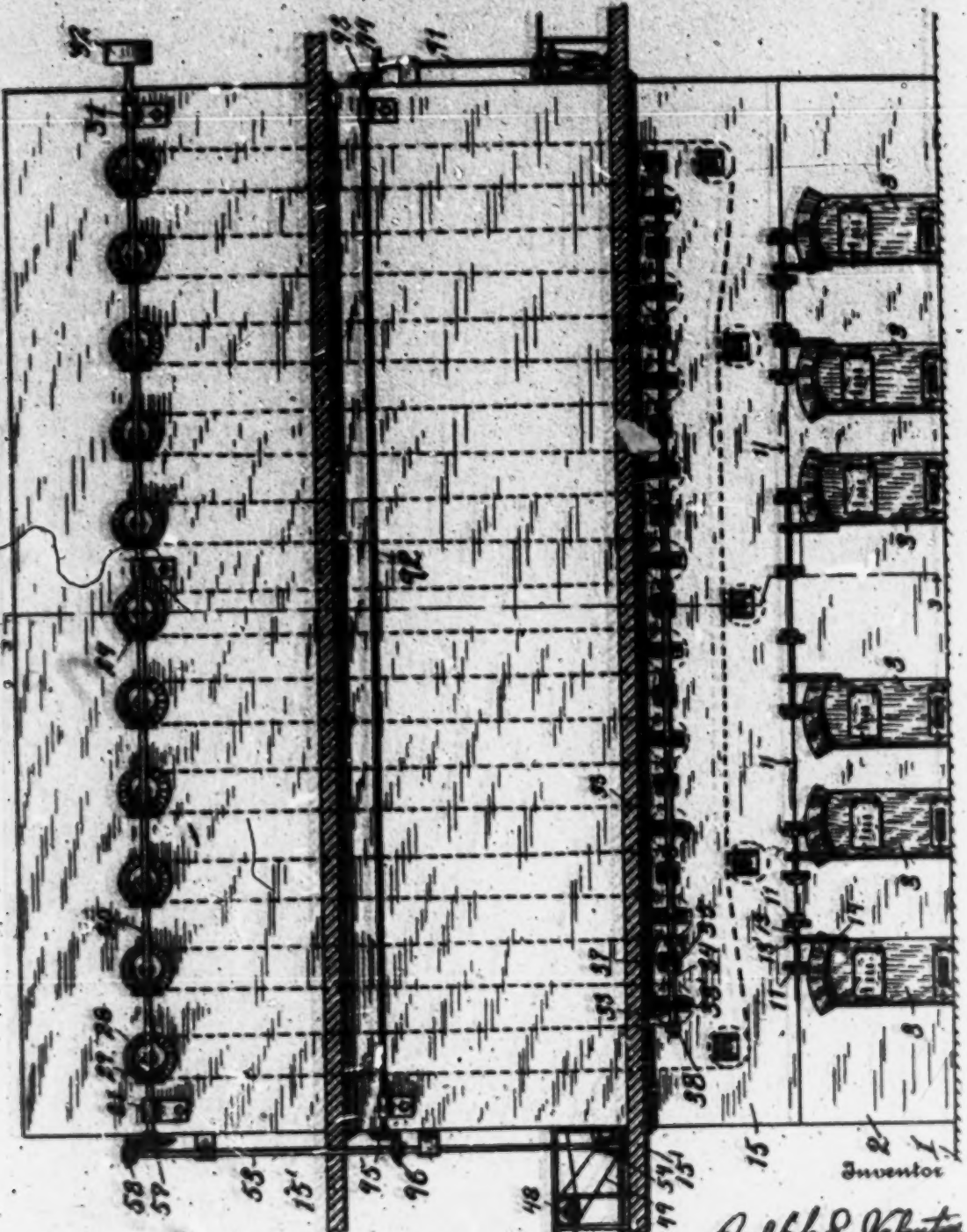
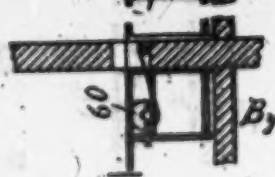


FIG. 1.



Witnesses
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APPLICATION FILED JAN. 24, 1912.

Patented June 15, 1915.

6 SHEETS—SHEET 2.

1,143,151.

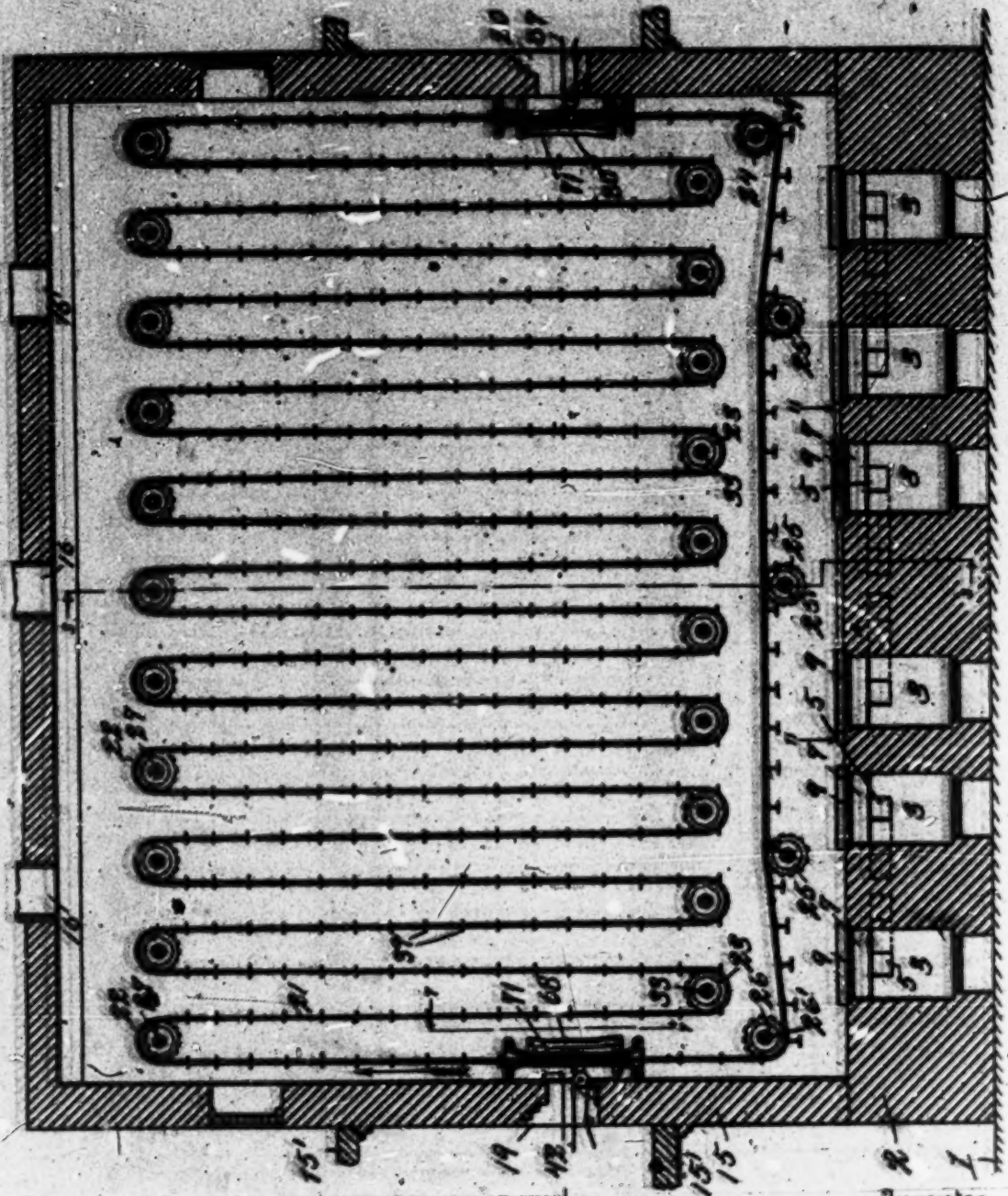


FIG. II.

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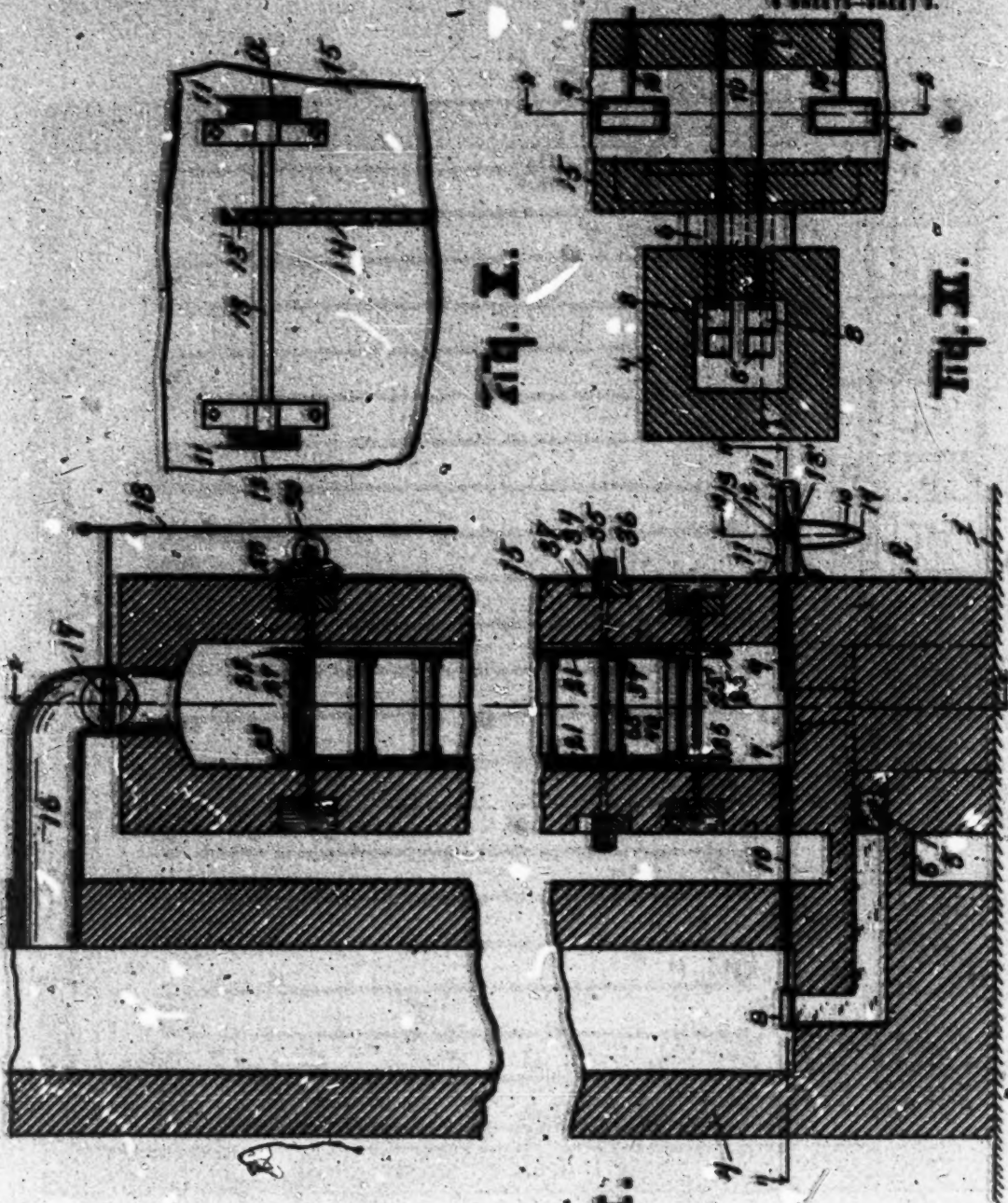
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APPLICATION FILED JAN. 34, 1912.

Patented June 15, 1918.

8 SHEETS—SHEET 3.

1,148,151.



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APPLICATION FILED JAN. 24, 1912.

Patented June 15, 1915.

6 SHEETS--SHEET 4.

1,143,151.

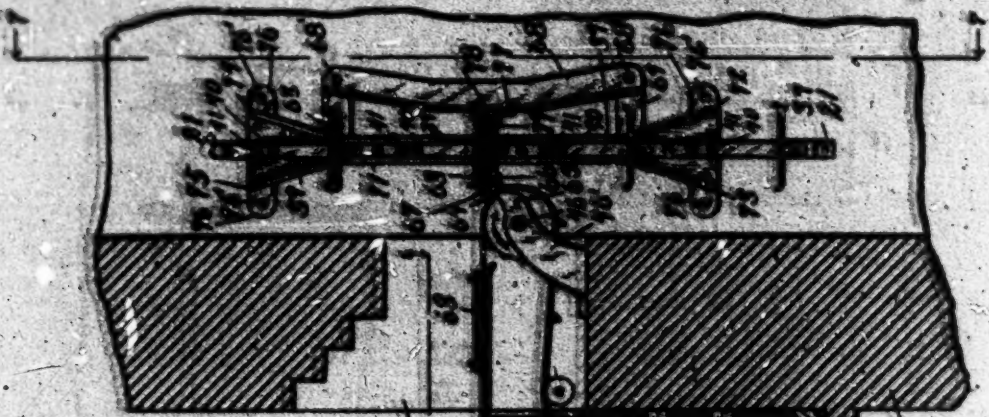


FIG. IV.

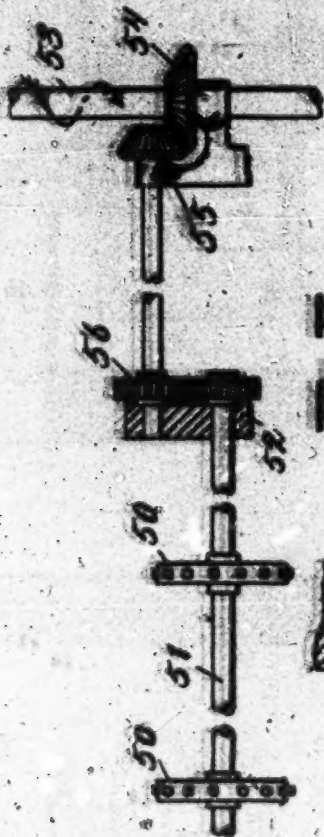


FIG. V.

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L

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APPLICATION FILED JAN. 24, 1912.

Patented June 15, 1915.

4 SHEETS—SHEET 5.

1,143,151.

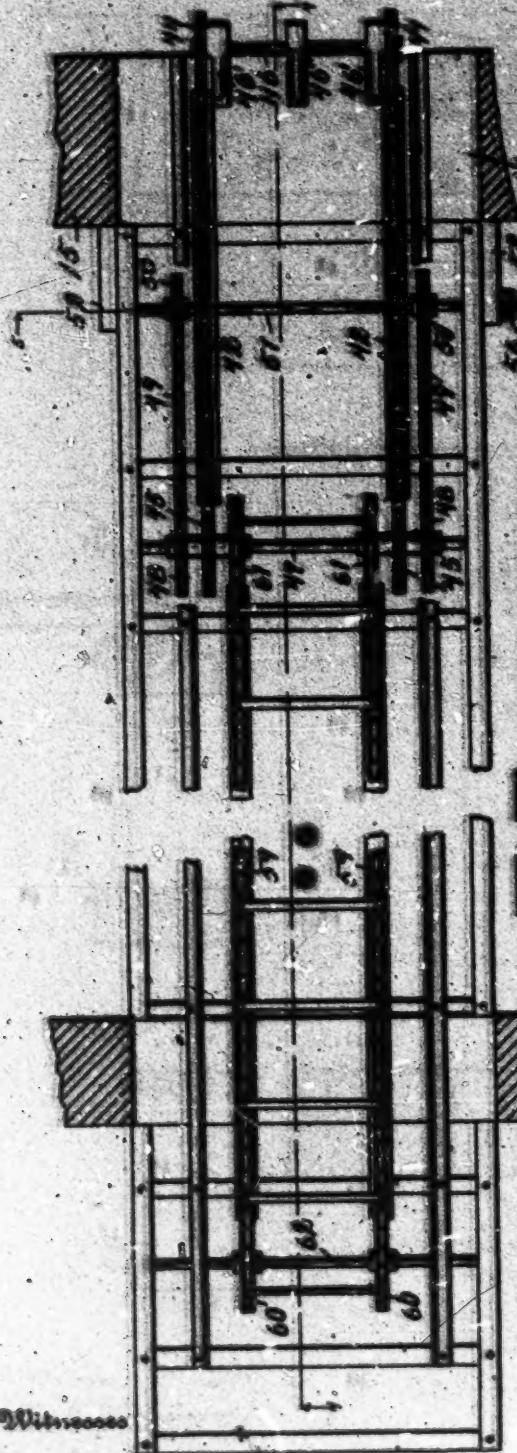


Fig. VI.



Fig. VII.



Fig. VIII.

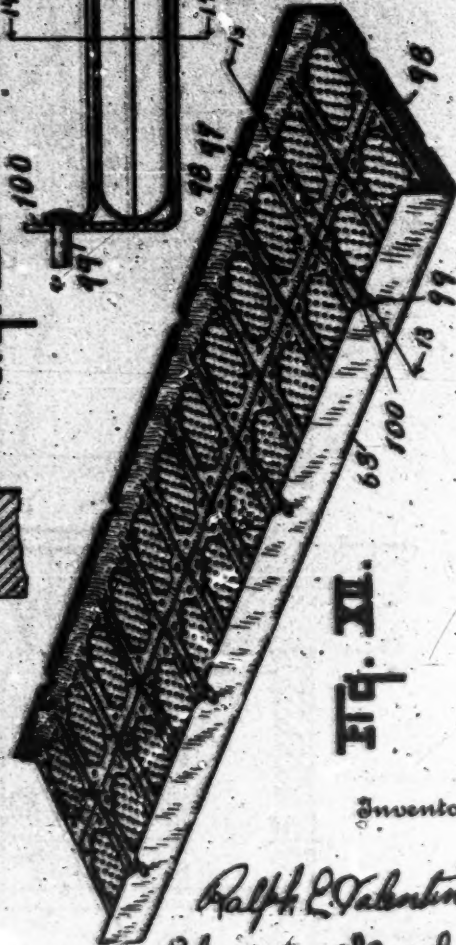


Fig. IX.

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427

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OVER.

APPLICATION FILED JAN. 24, 1912.

Patented June 15, 1915.

4 SHEETS—SHEET 6.

1,143,151.

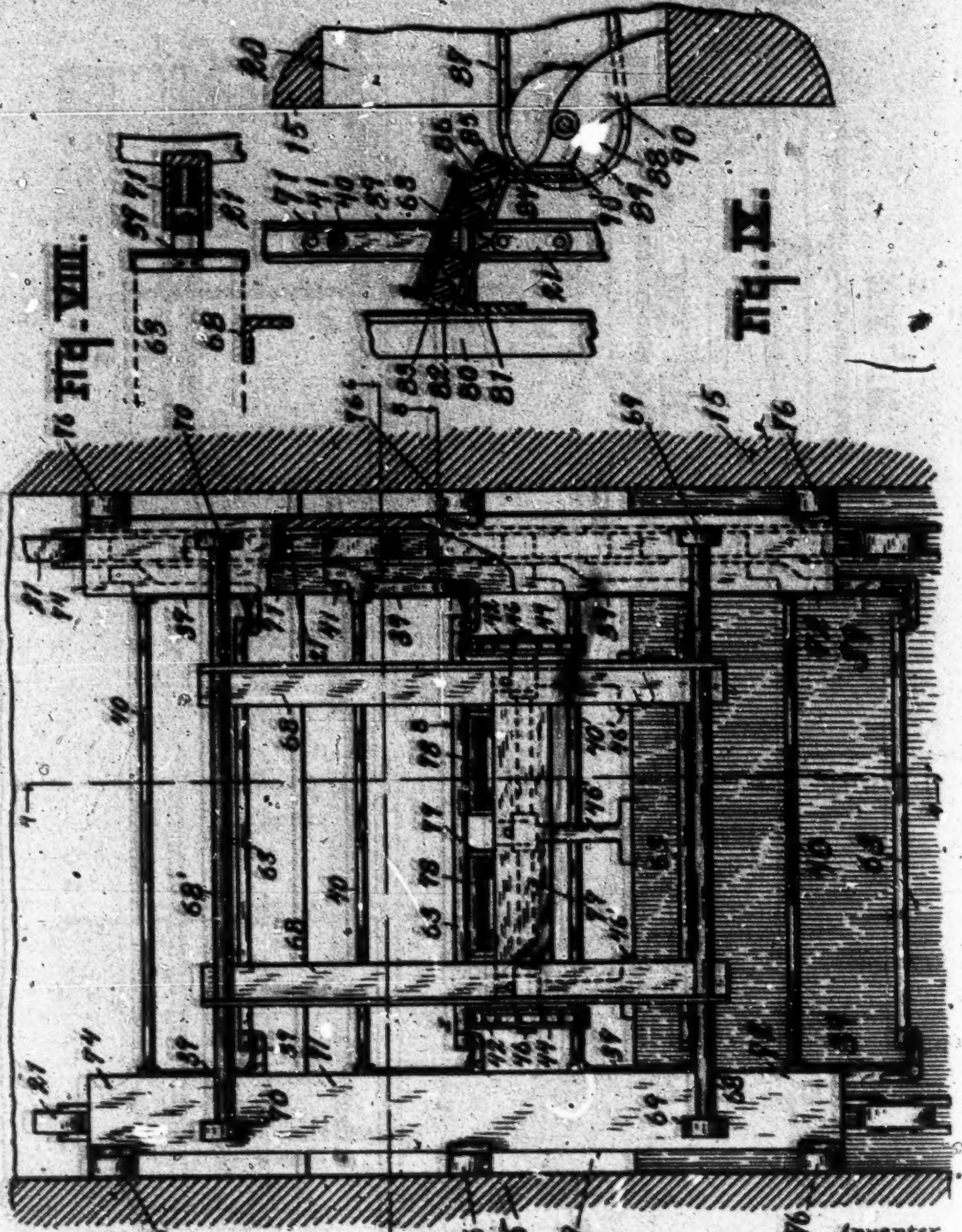


Fig. VIII.

Fig. IX.

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Fig. VII.

Ralph E. Valentine
Chapman & Hall

Attorney

UNITED STATES PATENT OFFICE.

RALPH E. VALENTINE, OF BATTLE CREEK, MICHIGAN, ASSIGNOR TO KELLOGG TOASTED CORN FLAKE COMPANY, OF BATTLE CREEK, MICHIGAN.

OVEN.

1,143,151.

Specification of Letters Patent. Patented June 15, 1915.

Application filed January 24, 1912. Serial No. 672,215.

To all whom it may concern:

Be it known that I, RALPH E. VALENTINE, a citizen of the United States, residing at Battle Creek, Michigan, have invented certain new and useful Improvements in Ovens, of which the following is a specification.

This invention relates to improvements in ovens.

It relates to ovens particularly designed for the baking of shredded wheat biscuits or flake cereal biscuits, although the oven is admirably adapted to a great variety of uses.

The objects of the invention are first, to provide an improved construction of oven in which the heat can be effectively regulated and controlled and the heating can be done with great economy by direct circulation of the products of combustion from the furnace; second, to provide an improved pan support and conveyer means for such an oven; third, to provide improved feeding devices for delivering the bake pans to such an oven; fourth, to provide improved discharge devices for discharging the contents from such an oven.

Further objects, and objects relating to details and economies of construction and operation will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure constituting a preferred embodiment of my invention is fully illustrated in the accompanying drawing, forming a part of this specification, in which:

Figure I is a side elevation view of an oven embodying the features of my invention. Fig. II is a vertical longitudinal detail sectional elevation through such an oven taken on a line corresponding to line 2-2 of Figs. III and XI. Fig. III is a detail transverse sectional elevation partially in broken section, taken on a line corresponding to line 3-3 of Figs. I, II and XI. Fig. IV is an enlarged detail view of the feeding mechanism for delivering the bake pans to the oven, the wall portions and certain of the shafts being taken in section, on a line corresponding to line 4-4 of Figs. VI and VII, the main machine parts in this connection being shown in full lines. Fig. V is an enlarged detail

sectional view taken on a line corresponding to line 5-5 of Figs. IV and VI, showing the details of the driving means of the feed mechanism. Fig. VI is an enlarged detail plan view in broken section of the feed mechanism leading to the oven, the same being taken on a line corresponding to line 6-6 of Figs. II, IV and VII. Fig. VII is an enlarged detail sectional view on a line corresponding to line 7-7 of Figs. II and IV of the feed mechanism at that point. Fig. VIII is a detail sectional view on line 8-8 of Fig. VII, showing the chain guides and other related stops and supports. Fig. IX is an enlarged detail longitudinal vertical sectional view through the delivery or discharge portion of the oven apparatus, showing how the pans are automatically discharged. Fig. X is an enlarged detail sectional view on a line corresponding to line 10-10 of Fig. III, showing the damper regulating means for controlling the flues to the chimneys and to the oven. Fig. XI is a detail sectional plan view on a line corresponding to line 11-11 of Figs. I, II and III, showing the damper means for controlling the flues and the relations thereof and of the flues the one to the other. Fig. XII is an enlarged detail perspective view of one of the pans which is handled by this improved oven. Fig. XIII is an enlarged detail transverse sectional view on line 13-13 of Fig. XII, showing the means of coupling these parts together. Fig. XIV is a detail transverse sectional view on line 14-14 of Fig. XIII, showing details of the pan, its cover and molds contained therein.

In the drawing all of the sectional views are taken looking in the direction of the little arrows at the ends of the section lines and similar numerals of reference refer to similar parts throughout the several views.

Referring to the numbered parts of the drawing, my improved oven structure is supported on a suitable foundation 1, and is made up of a base 2 which contains a series of furnaces 3-3-3, six in number, coupled in pairs, of any usual or desired construction, the same being here illustrated in conventional form. A series of chimneys 4, three in number, are placed back of the furnaces, and the furnaces are connected thereto by flues 5, one chimney serving for two of the furnaces, as clearly appears from a consideration of Figs. I, III and XI. A

flue connection 6 is between the body of the furnace and the base of the chimney 4. A flue 7 leads directly up from the furnace to the oven above to deliver the hot products of combustion directly thereto.

A damper 8 controls the flue 6 in the chimney, and a damper 9 controls the flue 7 which leads from each furnace up to the oven above. Horizontal rods 10 extending through suitable apertures in the walls of the furnace and chimney connect to these dampers for controlling the same. A rack 11 connected to each rod 10 is controlled by the action of a pinion 12, which pinions are carried in pairs on a common shaft 12 suitably supported on brackets outside each furnace, the same being controlled by a hand chain 14 on a sprocket wheel 13 within easy reach of the operator.

The oven 15 is of considerable height, extending in the present instance through three stories of a building, the floors of which 15' 15' are indicated in Figs. I and II. The oven 15 rests upon base part 2, and embraces the flues 7 of the various furnaces, which furnaces deliver their heated products of combustion directly up into the same. Flues 16—16, six in number, are provided at the top of the oven and connect to the chimneys 4 above the oven.

Dampers 17 are provided in the flues 16 and are controlled by suitable chain connections 18 extending through the floor below. An inlet opening or door 19 leads into the oven, at a convenient height from the second floor 15', and a discharge door or opening 20 is at the opposite side.

Within the furnace is an endless conveyer 21 made up of pairs of sprocket chains extending in loops over driven sprocket wheels 22 supported on suitable shafts 27 that extend out into bearings at each side of the oven toward its top. The conveyer 21 loops under sprocket wheels 23 disposed in pairs at each end of shafts 33 at the bottom. The conveyers pass down at the discharge side of the oven. Idle sprocket wheels 24 on shaft 24' and pairs of wheels 25—25—25 supported on idle shafts 25' are disposed in the lower part of the oven to support and guide the conveyer on its return to the feeding point and idle sprocket wheels 26 supported on shaft 26'. The direction of rotation is indicated by the arrow at the left of Fig. II, being up on the intake side of the oven and down on the discharge side.

The transverse shafts 27 are each provided with bevel gears 28 which are driven by the intermeshing bevel gears 29. The gears 29 are carried on the longitudinal driving shaft 30 which is supported on suitable boxing 31—31 at intervals along the side of the oven, and are driven by the pulley 32 or by any suitable means as a chain and wheel.

Tension is maintained on the conveyer by supporting the transverse shafts 33 on pivoted arms 34, the same being pivoted at 35, and weights 38 at the opposite end preserve the required tension. There is an arm and weight for each downwardly depending loop of the conveyer, and the shafts 33 play in slots 33' at the sides of the oven, whereby an even tension is preserved upon the conveyer throughout its travel.

Carriers 39 on each chain are connected together by cross bars 40, and are pivoted at 41 41 between the chains of conveyer 21 which are in pairs for carrying these pivoted carriers. The bottom cross portions of these carriers are slightly upturned to afford a retaining means for the bake pans that are delivered thereto. An endless conveyer 42 with projection attachments 43 on certain of the links serves to carry and deliver the bake pans 63. (see Fig. IV) to the carriers 39 of the conveyer 21. The endless conveyer 42 is carried by a pair of sprocket wheels 44—44 at one end and sprockets 45—45 at the opposite end. The sprocket wheels 44 are supported on a shaft 46 which is carried in suitably projecting brackets 46' 46' in proper position to deliver the bake pans to the carrier 21 within the oven. The sprocket wheels 45 45 are supported on the shaft 47 which is supported in suitable bearings.

The shaft 47 is driven by sprocket chains 49 over the sprocket wheel 48 from the sprocket wheel 50, which is supported on the shaft 51. A pair of these chains serves to drive these parts perfectly even to deliver the bake pans in perfectly square position into the oven. The shaft 51 is supported in suitable bearing brackets 52 52 at each side thereof. See particularly Figs. IV, V and VI. The shaft 51 is driven by the gears 56 which are driven by suitable connections from the bevel gear 55 which is driven by bevel gear 54 on the vertical shaft 53. The vertical shaft 53 is driven by the gear 58 which intermeshes with the bevel gear 57 on the main driving shaft 30.

An auxiliary endless conveyer 59 is made up of a pair of sprocket chains carried on sprocket wheels 60 at one end and on sprocket wheels 61 at the opposite end. The sprocket wheels 61 are supported on the shaft 47 already described. The sprocket wheels 60—60 are supported on the shaft 62. This conveyer is driven by the same connection that drives the conveyer 42. This auxiliary conveyer comprises wooden slats and is very light, as it is not required to withstand the high degree of heat to which the main conveyer is subjected in delivering the pans to the oven.

The bake pans 63 are carried by the conveyers 59 and 42 and delivered into the oven by passing onto a set of rollers 64, 139

which are supported on an extension 65 of the brackets 46.

An angle bar 66 serves as a support for cross bars 67 which carry the series of the said rollers 64 (see particularly Fig. IV).

Within the oven are upright guide and stop bars 68 made of angle bars which are joined together by suitable transverse bars 68' disposed therethrough at top and bottom, being secured to pairs of arms 69 at the bottom and to the pairs of arms 70 at the top. These arms extend from bottom and top respectively of the guide bars 71. The guide bars 71 are provided with side flanges which diverge at 72-73 at the bottom to receive the upwardly traveling chain, and also diverge at 74-75 at the top to permit the chain to be passed freely up and yet be properly retained at the receiving point to insure correct engagement of each carrier with the pans as they are successively delivered.

Laterally projecting ears 76 serve as a securing means for attaching these guide bars or plates 71 to the sides of the oven, three pairs of these being provided for each of the said guide bars 71. Stop bars 68 are coupled together by an angle bar 77, which carries the cross bars 79 which extend forwardly toward the cross bars 66 in which are journaled the rollers 78. A gap is left between the two sets of rollers for the passage of the cross bars 40 which couple the carrier sides together. It will thus be seen that the chain of the carriers may pass upwardly between the sets of rollers 64-78 and pick up by their projecting ends the pans 63 which are delivered thereto by the conveyer 42, as before described.

As the carriers are pivoted and hang down, they serve to carry the pans 63 through the oven up and down from front to rear until they come to the discharge opening 20.

At the discharge opening 20, the delivery apparatus is substantially duplicated, except that the rollers are on an incline downwardly and outwardly for discharging the bake pans out of the oven. The guides 71 are at each side and secured in the same way, see particularly Fig. IX. An angle guide bar 80 corresponds to the guiding stop bar 68 and to this is secured a horizontal bar 81 corresponding to bar 77 on which are supported the discharge rollers 82 on the inclined cross bars 83. A corresponding bar 89 is on the opposite side and carries rollers 85 on the inclined cross bars 86, which are separated from the inclined cross bars 83 to permit the carriers to descend between the same. When the carrier descends, the bake pans 63 come into contact with the inclined rollers and are discharged downwardly and outwardly to a suitable conveyer 87. The carrier 87 is carried on the shaft 88 which sup-

ports the sprocket wheels 89 which carry the chains constituting the same. Brackets 90 with journal bearings support the shaft 88. The cross angle bar 84 is secured to extensions 90' of these brackets 90.

The carrier 87 is driven in precisely the same manner as the carrier which feeds the pans to the oven except it conveys from the oven and it is thought not to be necessary to detail these parts. The vertical shaft 91 is driven from the horizontal shaft 92 by the intermeshing bevel gears 93-94, the shaft 93 being driven by the bevel gear 95 from the bevel gear 96 on the vertical shaft 53 (see particularly Fig. I for these details).

The pans 63 are specially constructed and provided with covers 97, and the pans 63 carry half molds 98 and the covers 97 also carry half of the molds 8'. These parts register together by the fitting of the cover within the pan, and projecting pins 99 on the cover engage the notches 100 on the upwardly turned flanges at the sides of the bake pan to secure the longitudinal register, the flanges fitting the one within the other to insure the fitting in the opposite direction. These bake pans are made the subject matter of my copending patent application filed on even date herewith, Patent No. 1,124,363, and will not be described in detail at this point.

My improved oven I desire to state and its various devices are capable of great modification without departing from my invention. I believe the specific form in which I have shown the different parts and their combinations to be preferable to any other, and desire to claim the same specifically. I desire, however, to claim the invention broadly, as pointed out in the appended claims. The pans may be delivered into this oven by the hands of an operative, although that would be a tedious process and would involve considerable risk and waste over the method of delivering the same by the conveyer. Also an operative might, by proper devices, withdraw the pans from the oven when they are delivered at that point, but the devices which I have made use of are automatic and of the highest utility, resulting in great saving of labor and insuring high speed in the operation of the oven, which is made of such capacity that the chain conveyer therein has a comparatively rapid movement.

I desire to state that the same devices might be made use of in ovens otherwise heated, but I believe they are especially well adapted to the particular oven which I have shown, and I desire to claim the same in combination therewith.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In an oven apparatus, the combination of a suitable oven; a suitable endless con-

veyer disposed within the said oven and moving upward at the intake side and downward at the discharge side; suspended carriers thereon, the ends of each of which are connected by a suitable rod and which are provided with depending engaging portions to engage and convey a pan; a divided support with suitable rollers disposed at the intake side of said oven in the ascending path of said conveyer, one portion disposed without the said conveyer and the other portion disposed and supported within the said conveyer; feed conveyer means for delivering bake pans to the said support timed to cooperate therewith whereby said pans will be picked up by the rising carriers; and discharge devices for the said oven disposed at the discharge side in the descending part of said conveyer comprising a divided support, one portion of which is disposed without the said conveyer and the other portion of which is disposed within the same, the said parts being inclined outwardly to automatically discharge the bake pans from the descending conveyer, all coacting substantially as described and for the purpose specified.

2. In an oven apparatus, the combination of a suitable oven; a suitable endless conveyer disposed within the said oven and moving upward at the intake side and downward at the discharge side; suspended carriers thereon, the ends of each of which are connected by a suitable rod and which are provided with depending engaging portions to engage and convey a pan; and discharge devices for said oven provided with suitable pan engaging rollers, all coacting substantially as described and for the purpose specified.

3. In an oven apparatus, the combination of a suitable oven; a suitable endless conveyer disposed within the said oven and moving upward at the intake side and downward at the discharge side; suspended carriers thereon, the ends of each of which are connected by a suitable rod and which are provided with depending engaging portions to engage and convey a pan.

4. The combination with an oven of an endless conveyer made up of sprocket chains with carriers secured thereto; rods connecting said carriers, driving sprocket wheels in the upper part of said oven for conveying the same, over which the endless conveyer is looped; idle sprocket wheels carried on shafts extending transversely of said oven, levers pivoted to the walls of said oven in which said shafts are journaled, and suitable weights disposed on the ends of said levers whereby the slack from said conveyer is taken up; suitable guides for the said conveyer chains disposed at each side of the oven at the intake and discharge side thereof, with suitable feed and discharge devices

associated therewith, all coacting substantially as described and for the purpose specified.

5. In an oven apparatus, the combination of suitable conveyer chains, pan engaging supports carried by said chains, rods connecting opposite pan engaging supports; suitable guides therefor; supports projecting within the oven for supporting pans to be engaged by the said carriers; and endless conveyers for delivering pans to the said support to be taken up successively by the said conveyers so that the same can be fed one at a time automatically; and suitable spacing devices for distributing the pans in such position whereby they will be taken up by the said conveyer one at a time.

6. In an oven apparatus, the combination of a suitable oven provided with intake and discharge openings therein, an endless conveyer disposed within the said oven and moving upward at the intake side and downward at the discharge side thereof, said conveyer comprising a pair of carrier chains, pan engaging members carried by said chains and connected by rods, a support carried by the wall of the oven, a set of rollers carried by said support adjacent the intake opening of said oven, a second support carried by the wall of the oven, and a second set of rollers carried by said second support in line with the first set of rollers, feed conveyer mechanism carrying baking pans to said supports whereby they will be picked up by the rising pan engaging members, said conveyer mechanism being disposed in alignment with said rollers so as to deliver the pans directly thereon, and driving means for said endless carrier, all coacting substantially as described for the purpose specified.

7. In an oven apparatus, the combination of a suitable oven provided with intake and discharge openings, an endless conveyer disposed within the said oven and moving upward at the intake side and downward at the discharge side thereof, said conveyer comprising a pair of carrier chains, pan engaging members carried by said chains, rods connecting said pan engaging members, a divided support carried by the wall of the oven adjacent the intake opening therein, said divided support being provided with suitable rollers, a feed conveyer in line with said rollers for delivering pans thereto whereby they will be picked up by the rising pan engaging members, said rollers being spaced apart to permit the rods carried by the carrier chains to pass therebetween, and means for driving said endless conveyer, all coacting substantially as described for the purpose specified.

8. In an oven apparatus, the combination of a suitable oven provided with intake and discharge openings, an endless conveyer disposed within the said oven and moving up-

1,143,151

ward at the intake side and downward at the discharge side thereof; said endless conveyer comprising a pair of carrier chains, pan engaging members carried by said carrier chains, rods connecting said pan engaging members, a divided support carried by the walls of said oven adjacent the discharge opening therein, rollers carried by said divided support in position to be engaged by the descending pans, said rollers being spaced apart to permit the rods carried by said carrier chains to pass therebetween, said support being inclined downwardly

toward the discharge opening, conveyer means in line with said rollers for receiving and carrying away the pans discharged therefrom, and driving means for said endless conveyer, all coacting substantially as described for the purpose specified.

In witness whereof, I have hereunto set my hand and seal in the presence of two witnesses.

RALPH E. VALENTINE. [L.S.]

Witnesses:

FRANK E. FENN,
CHAS. M. MARBLE.

DEFENDANT'S EXHIBIT NO. 245.

Book of Miscellaneous Patents Issued to Others Than the Plaintiff or Defendant.

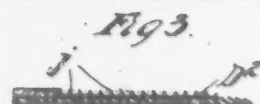
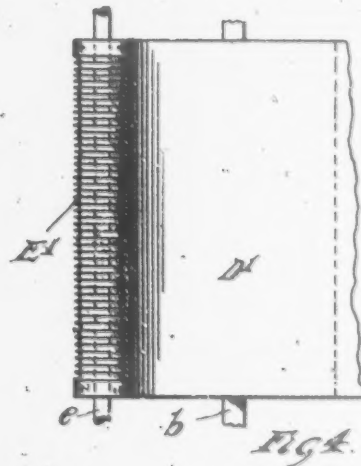
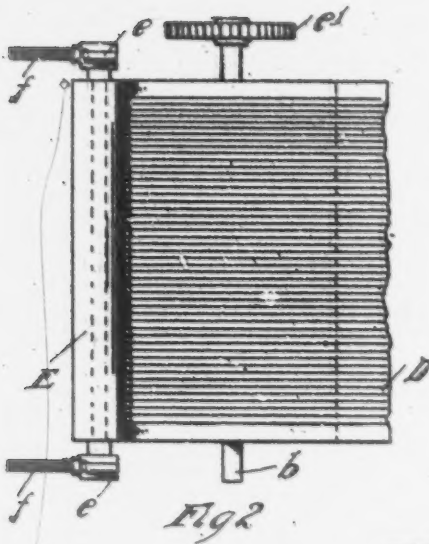
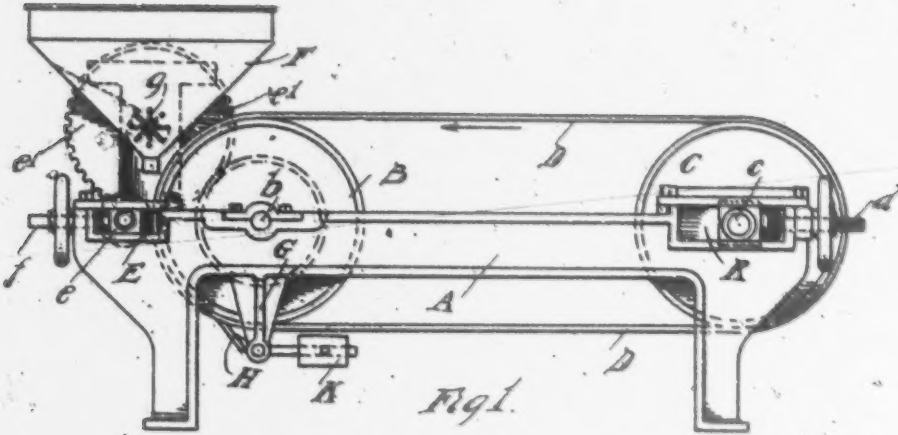
(United States Patents.)

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No. 782,109.

PATENTED FEB. 7, 1905.

M. E. OOOLEY.
SHREDDING MACHINE.
APPLICATION FILED MAY 11, 1903.



WITNESSES

J. H. Manning
May E. Kott.

INVENTOR

Mortimer & Corley

By

Parsons & Burton
Attorneys.

UNITED STATES PATENT OFFICE.

MORTIMER E. COOLEY, OF ANN ARBOR, MICHIGAN, ASSIGNOR OF ONE-HALF TO G. FRANK ALLMENDINGER, OF ANN ARBOR, MICHIGAN.

SHREDDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 782,109, dated February 7, 1905.

Application filed May 11, 1903. Serial No. 156,560.

To all whom it may concern:

Be it known that I, MORTIMER E. COOLEY, a citizen of the United States, residing at Ann Arbor, county of Washtenaw, State of Michigan, have invented a certain new and useful Improvement in Shredding-Machines; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to shredding-machines, and has for its object a machine intended to produce shreds or thin strips of dough that are adapted to be afterward used in constructing what are known as "shredded-wheat" biscuits.

In the drawings, Figure 1 is a side elevation. Fig. 2 is a plan of the front end of the belt and of the pressure-roll. Fig. 3 is a cross-section of the belt. Fig. 4 shows a smooth belt with grooved pressure-roll. Fig. 5 shows a grooved belt with the corrugations made separate from the main body of the belt.

A indicates a frame on which there are mounted two rolls B and C on shafts *b* and *c*. These rolls are both smooth and are similar to large broad belt-wheels. Around them is stretched a belt D, preferably of steel, like that used for band-saws. The belt D is provided with grooves which run lengthwise of it on the external side thereof—that is, on the side which does not come in contact with the rolls B and C. A pressure-roll E, of smooth material, is held in suitable adjustable boxes on the frame A, and a feed-hopper F is mounted above the tangential point of the belt D and the pressure-roll E. Brackets G support a stripper-comb H, that is held pivotally to the bracket and is held in engagement against the belt D by a weight K. One of the rolls, as the roll C, is adjustable with respect to the other and is provided with means for both adjusting and trammings it. For this purpose the boxing in which the shaft *c* engages slides in a guide R, that forms part of the frame A and is actuated in its sliding motion by a screw *d*. The boxing *e* of

the pressure-roll E is arranged to be adjusted by the same character of adjustment by screw *f*.

In the mouth of the hopper F is a force-feed wheel *g* on the shaft of the main driving-wheel *e'*. The main driving-wheel *e'* meshes with a gear-wheel on the shaft of the roll B.

Instead of a plain roll E and a corrugated belt D a grooved roll E' is used in connection with a smooth belt D'. The belt D' is constructed with a smooth body K and with attached strips *j*, such construction being used to overcome difficulties of construction of the tempered-steel belt D.

What I claim is—

1. In a shredding-machine, the combination of parallel rollers, means for varying the distance between them, a flexible belt traveling on said rollers, said belt being grooved longitudinally and externally, and a pressure-roll engaging against the belt and a stripper engaging against the belt, substantially as described.

2. In a shredding-machine, the combination of an endless belt grooved longitudinally and externally thereof, means for carrying it, means for actuating it, and a pressure-roll whose axis is transverse to said belt, engaging closely against the high parts of the surface thereof, substantially as described.

3. In a shredding-machine, the combination of a belt grooved longitudinally and externally, rolls on which the belt is carried, means for adjusting the rolls, a pressure-roll engaging against the belt, and a stripper engaging against the belt, substantially as described.

4. The combination of a belt grooved longitudinally and externally, means for supporting and actuating the belt, a pressure-roll engaging against the belt, a feeding device, and a stripper engaging against the belt, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

MORTIMER E. COOLEY.

Witnesses:

JAMES H. WADE.

GEORGE D. WILLCOX.

No. 820,899.

PATENTED MAY 15, 1906.

W. E. WILLIAMS.
SHREDDED WHEAT BISCUIT.
APPLICATION FILED OCT. 4, 1904.

Fig. 1

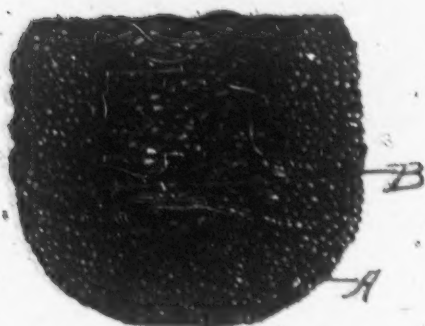


Fig. 2

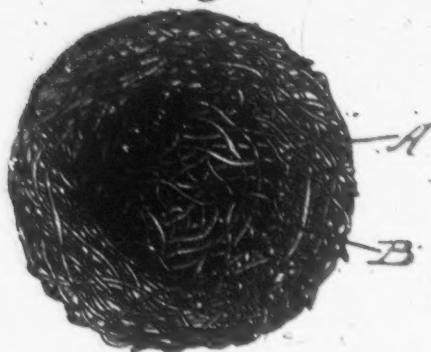
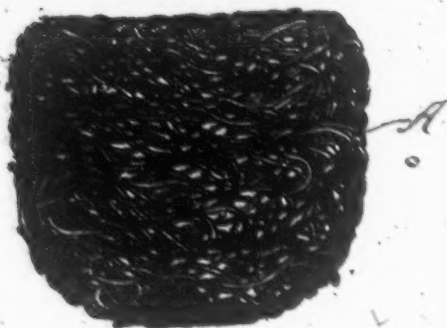


Fig. 3



Witnesses
J. H. Angell
S. M. Brown.

Inventor
William E. Williams,
by Nathaniel Crane
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM ERASTUS WILLIAMS, OF CHICAGO, ILLINOIS.

SHREDDED-WHEAT BISCUIT.

No. 890,899.

Specification of Letters Patent.

Patented May 15, 1906.

Application filed October 4, 1904. Serial No. 227,147.

To all whom it may concern:

Be it known that I, WILLIAM ERASTUS WILLIAMS, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Shredded-Wheat Biscuits, of which the following is a specification.

The object of my invention is to provide a biscuit of pleasing appearance that shall have many advantages over biscuits heretofore in use. With this end in view, suitable food materials are converted into filamentary form and then made into cup-shaped biscuits.

In the accompanying drawings, Figure 1 is an axial section of such a cup-shaped biscuit. Fig. 2 is a top plan view of the same biscuit. Fig. 3 shows the biscuit in side view.

Any suitable material may be used, but cereals, and preferably whole wheat, corn, barley, rye, or oats, or some blending of them, is employed.

Whatever the material the filaments are assembled in the form of a cup A, preferably having all its walls of approximately the same thickness, which may be varied as desired, and, as appears from the drawings, the filaments are so arranged that although they interlace by passing toward and away from the interior of the cup the general course of nearly all of them is around the cup in various directions, the result being that the structure has a peculiar nest-like appearance while an axial section shows principally filament ends.

The biscuit described may be formed in any suitable manner, for example, by gently forcing into a suitable cavity or mold the desired quantity of more or less interlaced fibers having for the most part the same general direction, the fibers being given a somewhat annular direction, either beforehand or while they are passing into the cup. In the latter case the cup may be rotated or the fibers themselves may be carried in the desired direction.

The size and form of the cup are such that it approximately fits the dishes in which such

foods are ordinarily served, and obviously cream and sugar or the like may be placed in the cavity B, whence the sponge-like biscuit absorbs them.

This biscuit entirely eliminates the evils incident to pouring cream upon the convex surface of biscuit whose ends or some filaments of them often project beyond the margin of the containing dish. It has advantages also in that its comparatively thin shell is readily broken down with a spoon or fork and in that meats, fruits, eggs, jellies, and many other articles of food may be very conveniently served in the cup and thus a great variety of appetizing and healthful dishes may be quickly formed with this biscuit as a basis.

The biscuit being merely a thin shell in comparison with the ordinary biscuit, it is quickly and evenly baked and its exposed surface is relatively so large that nearly all the filaments of the whole mass of the biscuit is made brown and brittle, either originally or when slight dampness has lessened the very desirable crispness.

The biscuit being of such a light filamentary character has the quality of tenderness or crispness without the use of any leavening or shortening material and because it contains no such foreign material it readily takes on the flavor of even delicately-flavored foods placed within it.

What I claim is—

1. A cup-shaped biscuit made up of interlaced cereal filaments whose general courses are around the cup in various directions, forming a nest-like structure.

2. A cup-shaped biscuit having its walls made up of interlaced cereal filaments forming a nest-like structure with a rounded edge the general course of which is approximately followed by the filaments visible at that edge.

Signed at Chicago the 28th day of September, 1904.

WILLIAM ERASTUS WILLIAMS.

Witnesses:

ROBT. C. BORN,
CECIL BRONSON.

No. 878,262.

W. E. WILLIAMS.
SHREDDING MACHINE.
APPLICATION FILED OCT. 4, 1904.

PATENTED FEB. 4, 1908.

2 SHEETS—SHEET 1.

Fig-1

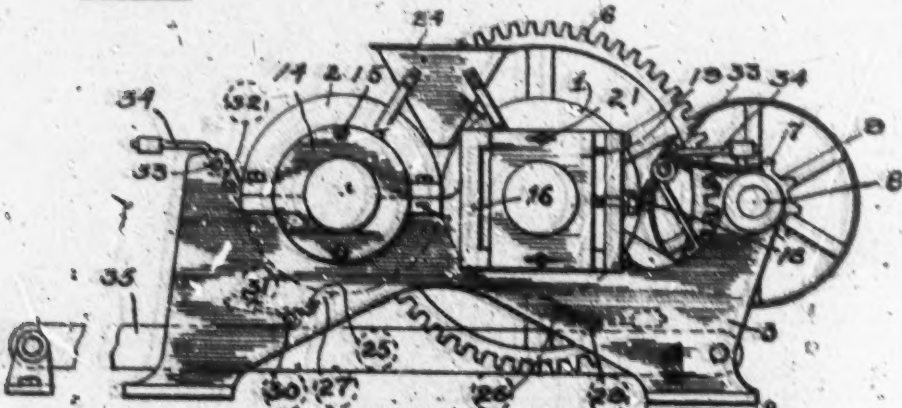
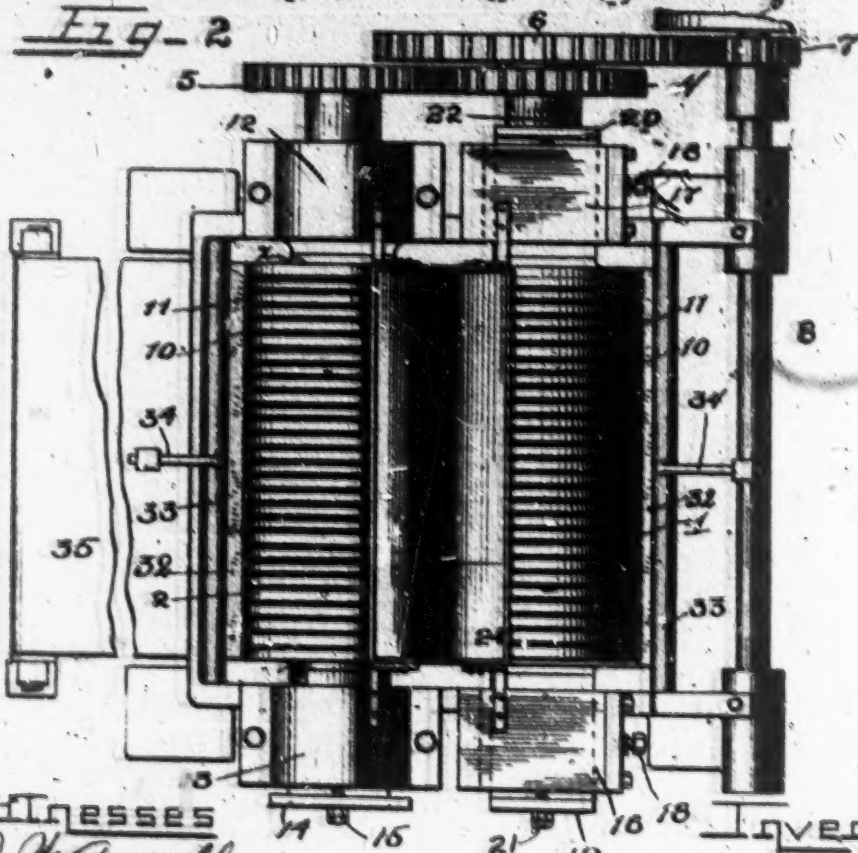


Fig-2



WITNESSES

J. H. Angell
D. M. Daniels

INVENTOR

William E. Williams

by Wallace Greening Atty

No. 878,262.

PATENTED FEB. 4, 1908.

W. E. WILLIAMS.
SHREDDING MACHINE.
APPLICATION FILED OCT. 6, 1904.

SHEETS—SHEET 1.

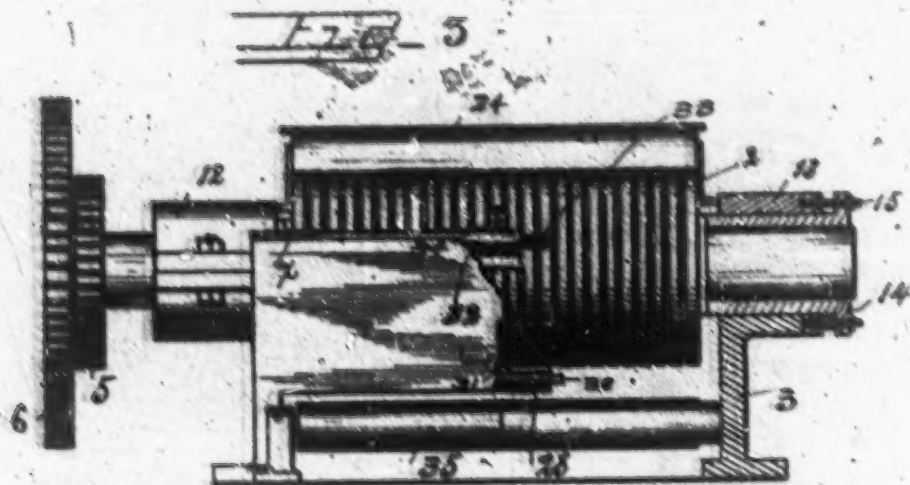


Fig. 4



Fig. 5

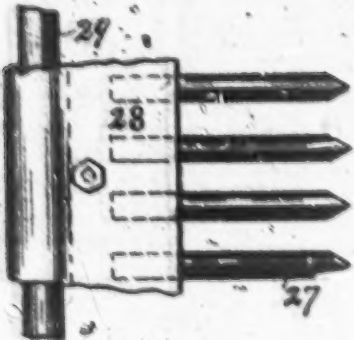
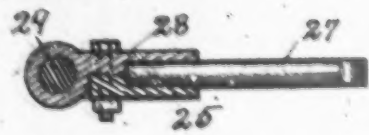


Fig. 6



Witnesses

S. M. Brown,
J. L. Eschman.

Inventor

William E. Williams
by Nathan Green, Atty.

UNITED STATES PATENT OFFICE.

WILLIAM ERASTUS WILLIAMS, OF CHICAGO, ILLINOIS.

SHREDDING-MACHINE.

No. 878,982.

Specification of Letters Patent.

Patented Feb. 4, 1908.

Application filed October 4, 1904. Serial No. 227,149.

To all whom it may concern:

Be it known that I, WILLIAM ERASTUS WILLIAMS, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Shredding-Machines, of which the following is a specification.

The object of this invention is to provide an improved machine for shredding cereals and the like for making shredded wheat biscuits and similar products.

In the accompanying drawings, Figure 1 shows my machine in side elevation. Fig. 2 shows the same in plan view. Fig. 3 is a view partly in section, looking from the left in Figs. 1 and 2. Fig. 4 is a detail view showing in longitudinal section a part of two shredding rollers in normal contact. Figs. 5 and 6 are, respectively, plan and sectional views of portions of certain scrapers.

In this machine, a pair of grooved rolls, 1, 2, are revolutely mounted, in contact, in a frame 3 and connected by gears 4, 5, driven from any suitable source of power by means of a belt pulley 9, shaft 8, pinion 7 and gear 6. The rolls are both provided with many circumferential, V-shaped grooves 10 so spaced as to leave between successive grooves an intact portion of the roller perhaps twice as wide as the grooves themselves, and each groove of each roller is located opposite an intact portion of the companion roller.

At one end of the roll 2, the roll shaft is mounted in a fixed bearing 12 against which a hub-like projection, 2, of the roll bears, while at the opposite end of the roll the shaft is borne by a sleeve 14, flanged at its outer end, adjustably mounted in a bearing 13, and normally made to hold the opposite end of the roller in contact with the bearing 12 by means of screws 15 which draw its flange toward the bearing 13 in which the screws work, and thus make it possible to compensate wear.

It is desirable that the companion roll, 1, should be adjustable longitudinally, to secure accurate registry between the grooves of one roll and the spaces between the grooves of the other roll, and also that it should be adjustable laterally and provided with means for pressing it toward the roll 2. With these objects in view, the shaft of this roll is mounted, at both ends of the roll, in sleeves 19, 20, similar to the sleeve 14, already described, and like it pressed against

the corresponding ends of the roller by screws, which in this case are designated by the numerals 21, 22, respectively. The bearings 16, 17, corresponding to the bearing 13, are in this case made wider than the sleeves which lie in them and these sleeves are adjusted laterally by screws 18, the flanges of the sleeves being slotted, as shown, to allow the sleeves to move laterally although the bolts or screws 21, 22 remain fixed.

The material to be shredded is placed in a hopper 24 whence it falls between the rolls, and as the latter are in contact, as nearly as may be, the material normally passes only in the grooves, from which it is removed by scrapers 25, 26 consisting of spring fingers 27 clamped in rocking bars 28, supported on rods 29, 30 and provided with counterweights 31 holding the spring fingers up to their work. If owing to imperfect contact material should pass between the cylindrical surfaces of the rollers, such material will be split into thin narrow ribbons by the spring fingers and will be removed by similar scrapers 32 mounted upon rods 33 and yieldingly held against the rollers by counterweights 34. The material on leaving the rolls falls upon a belt conveyor 35 driven in any suitable manner. It is to be observed that this arrangement of grooves permits nearly as many shreds as would be formed were one roller provided with closely contiguous grooves and yet gives a large body of metal between consecutive grooves. The rolls are thus much more durable and metal may be used that would otherwise be unsuitable.

What I claim is—

1. In a shredding machine, the combination with a pair of parallel, osculating co-acting rolls each having a series of circumferential grooves registering with ungrooved portions of the companion roll, of means for removing material from the grooves.

2. In a shredding machine a set of grooved rolls having alternate grooves and flat spaces, mounted in such manner that the grooves of one are opposite the spaces of the other and provided with adjustments for the rolls to secure a nicety of adjustment of the spaces, and means for removing the material from the grooves.

3. In a shredding machine a set of rolls provided with alternate grooves and flat spaces, with means for adjusting the rolls

to and from each other, and means for adjusting them longitudinally, and provided with scrapers for scraping the material from the rolls.

- 5 4. In a shredding machine, a set of rolls provided with alternate circumferential grooves and flat spaces with means for adjusting the rolls together and longitudinally, with scrapers composed of individual fin-

gers for scraping the grooves, and with flat scrapers for scraping the spaces substantially as shown.

Signed at Chicago this 28th day of September 1904.

WILLIAM ERASTUS WILLIAMS.

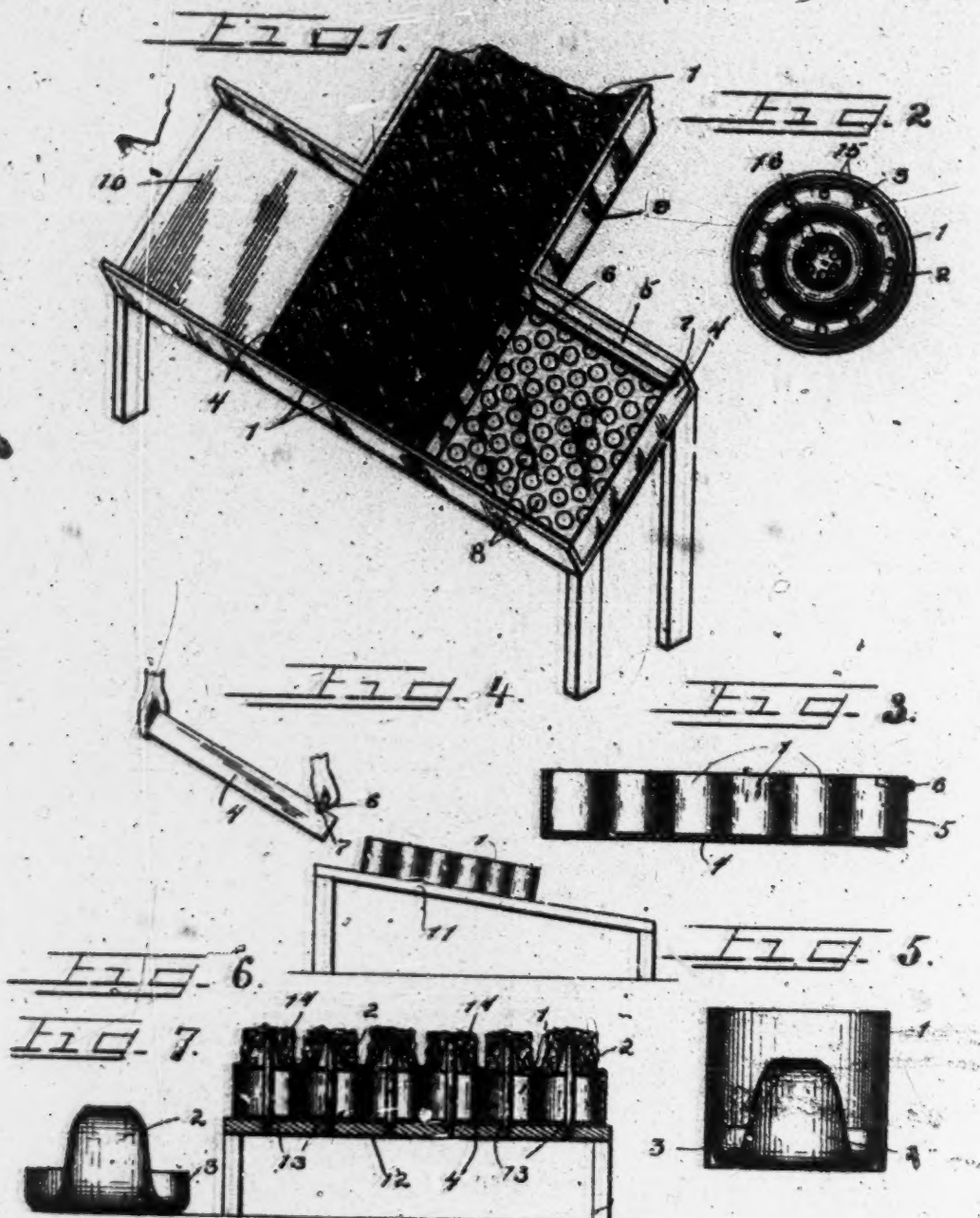
Witnesses:

ROBT. C. BORN,
CECIL BRONSON.

No. 896,964.

PATENTED AUG. 25, 1908.

W. E. WILLIAMS.
 BISCUIT BAKING APPLIANCE.
 APPLICATION FILED JUNE 20, 1906.



WITNESSES

J. H. Angell
 P. M. Abraham

INVENTOR

W. E. Williams.

By *Fuller & Greene*, Attys.

UNITED STATES PATENT OFFICE.

WILLIAM ERASTUS WILLIAMS, OF CHICAGO, ILLINOIS.

BISCUIT-BAKING APPLIANCE.

No. 898,964.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed June 30, 1905. Serial No. 267,706.

To all whom it may concern:

Be it known that I, WILLIAM ERASTUS WILLIAMS, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented a new and useful Improvement in Biscuit-Baking Appliances, of which the following is a specification.

The object of the invention is to provide convenient devices for use in the commercial manufacture of biscuits and particularly of biscuits of shredded cereals having a cup-like form. In making such biscuits, it has been a very difficult matter to form a cup-like mass that is neither too loose in texture nor too compact and that is not crushed down at any point but is uniformly light and open throughout. Obviously a slight pressure upon soft uncooked filaments destroys this practically indispensable characteristic. So when the material has been cooked it is very fragile and it has been very difficult to remove it from the cup in which it is baked without injuring its filaments. To avoid these difficulties and provide for charging and discharging the cups perfectly, rapidly and certainly are among the more specific objects of the invention. The desired ends are attained by providing novel cups to be used in a set in a novel pan.

In the accompanying drawings, Figure 1 is a perspective view illustrating the manner of using the novel cups and pans, preparatory to putting the same in the oven. Fig. 2 is a plan view of one of the baking cups. Fig. 3 is a vertical section of a baking pan filled with such cups. Fig. 4 illustrates the manner of using the novel pan when the cups are all to be removed bodily therefrom. Fig. 5 is a vertical section of one of the baking cups. Fig. 6 shows the method of removing the baked product from a set of the cups by taking advantage of their peculiar construction. Fig. 7 is a vertical section of the removable bottom of one of the baking cups.

The tables and special devices for using the pans and cups are without novelty herein claimed and are shown only to make clear the nature and objects of the invention.

In these figures, 1 represents the cylindrical body of a metal baking cup and 2 a bottom for the cup, made to slide easily into and out of the same and having the form of an inverted cup provided with central per-

forations 16 and also perforations 15 in its upwardly curved flange 3, of approximately semicircular cross-section. The highest part of the bottom is materially below the plane of the upper edge of the body, so that when the cup is filled the material takes a cup-like form and is not a mass having a central opening. When these cups are filled they are placed in pans 4 adapted to hold somewhat closely a definite number. Each pan lacks one side wall, so that a set of cups may slide together into and out of the pan, and is provided with a bail 6 pivoted to the sides of the pan at some distance from its open side in position to swing down into the plane of the missing side and obstruct the movement of the cups, and to swing upward when desired, above the plane of the cups which may slide in beneath it in filling the pan, and to serve also as a handle when the cups are to slide out of the pan, these uses being illustrated in Figs. 1 and 4. When a set of cups is secured in the pan, each occupies a fixed position, and centrally beneath each is an aperture 8, and thereby the pan may be pressed down upon a set of pins (Fig. 6), which thus raise the loose bottoms simultaneously lifting the biscuits out of the bodies of the cups and holding them in position for conveniently removing the baked product. The perforations in the loose bottoms not only allow circulation of air but permit drawing the filaments into the cup by atmospheric suction, which is necessary if they are to be evenly and compactly distributed without crushing.

What I claim is:

1. A baking cup having an upwardly removable bottom projecting upward, centrally, to form an inverted cup of materially less height than the lateral walls, and provided with a series of central perforations and a series of perforations near its margin.
2. The combination with a baking pan provided with a series of perforations in its bottom, of a set of baking cups having upwardly removable bottoms registering with said perforations, respectively.

WILLIAM ERASTUS WILLIAMS.

Witnesses:

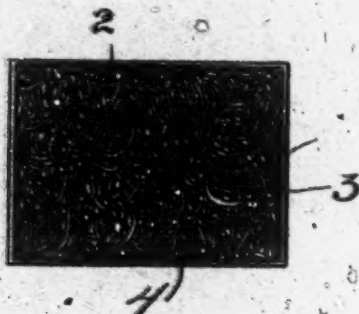
W. A. SHEAHAN,

W. F. DUNHAM.

No. 897,182.

PATENTED AUG. 25, 1908.

W. E. WILLIAMS.
SHREDDED WHEAT BISCUIT.
APPLICATION FILED JAN. 29, 1908.

Fig 1Fig 2Witnesses

J. H. Angell.
J. H. Lakin

Inventor

William E. Williams,
by H. H. Lakin, atty.

UNITED STATES PATENT OFFICE.

WILLIAM ERASTUS WILLIAMS, OF CHICAGO, ILLINOIS.

SHREDDED-WHEAT BISCUIT.

No. 897,182.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed January 29, 1908. Serial No. 415,280.

To all whom it may concern:

Be it known that I, WILLIAM E. WILLIAMS, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented new and useful Improvements in Shredded-Wheat Biscuits, of which the following is a specification.

The object of my invention is to produce a preferably flat shredded wheat biscuit which, instead of being compact, dense and harsh, as some have been made in order that they may bear handling and shipping, shall be of loose or open texture, crisp, and fragile and yet capable of withstanding the rough treatment just mentioned. Children, especially, almost invariably dislike the compact biscuits mentioned, while they are usually especially fond of the fragile products made in accordance with this invention.

In the accompanying drawings: Figure 1 is a plan view of one form of the novel biscuit. Fig. 2 is an edge view of the same.

The body 2 of the biscuit consists of a preferably flat mass of variously curved, overlapped and interlaced cereal shreds, and surrounding this body is a narrow, relatively thin, continuous strip 3, 4 of the same material as the shreds and integrally connected along its inner edge with the central mass of shreds, from which it is in fact usually formed as hereinafter stated. The strips form a sort of frame; preferably in the medial plane of the biscuit, as shown, and when the biscuit is baked this strip or rib though brittle becomes rigid enough to support and protect the more fragile shreds.

The biscuits may be formed in any suitable way, but I prefer to make them by first forming a relatively wide, flat sheet of open

texture made up of variously curved, interlaced and overlapped shreds in a more or less plastic condition, and then compressing narrow bands, of the material forming the sheet, along intersecting lines, preferably at right angles, and dividing these bands longitudinally. In those portions of the fibrous sheet which are compressed to form the bands, the shreds lose their individuality and become a thin, practically homogeneous ribbon. The sheet is thus divided into biscuits like that shown in the drawings, each consisting of a comparatively loose or open mass entirely surrounded by an integral, narrow, thin, relatively compact and dense projecting rib or frame which when dried or baked protects the body, although it forms but a small fraction of the entire biscuit.

What I claim is:

1. A biscuit composed of a mass of loosely interlaced and overlapped shreds integrally united around its entire margin by a narrow compact mass of the same material.

2. An approximately flat biscuit composed of a body of curved, interlaced and overlapped shreds, forming a loose or open mass, integrally connected on all sides with a narrow compact frame, of the same material, the medial plane of the biscuit, protecting the same in handling and during transportation.

In witness hereof I have hereunto subscribed my name on this 24th day of January, 1908, in the presence of two subscribing witnesses.

WILLIAM ERASTUS WILLIAMS.

Witnesses:

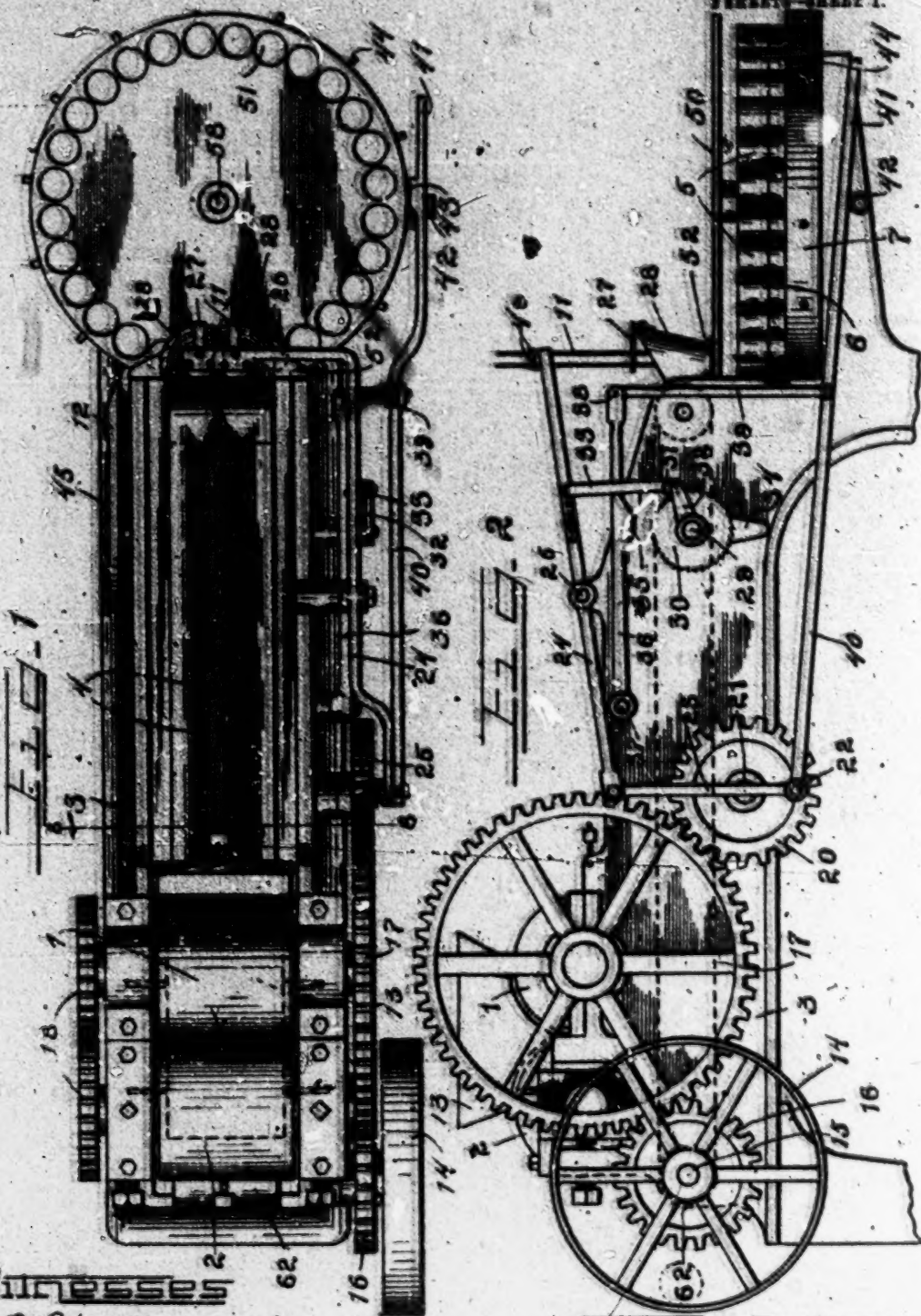
J. A. LA BREE,
R. ROPER.

W. E. WILLIAMS.
MACHINE FOR MAKING SHREDDED WHEAT BISCUITS.
APPLICATION FILED JUNE 23, 1906. RENEWED MAR. 16, 1909.

931,243.

Patented Aug. 17, 1909.

PATENT-SHEET 1.



WITNESSES

J. H. Angell
K. H. H. H.

INVENTOR

W. E. Williams
By H. H. H. H.

W. E. WILLIAMS.

MACHINE FOR MAKING SHREDDED WHEAT BISCUITS.

APPLICATION FILED JUNE 30, 1909. RENEWED MAR. 18, 1909.

981,248.

Patented Aug. 17, 1909.

SHEET-SHEET 1

FIG. 3

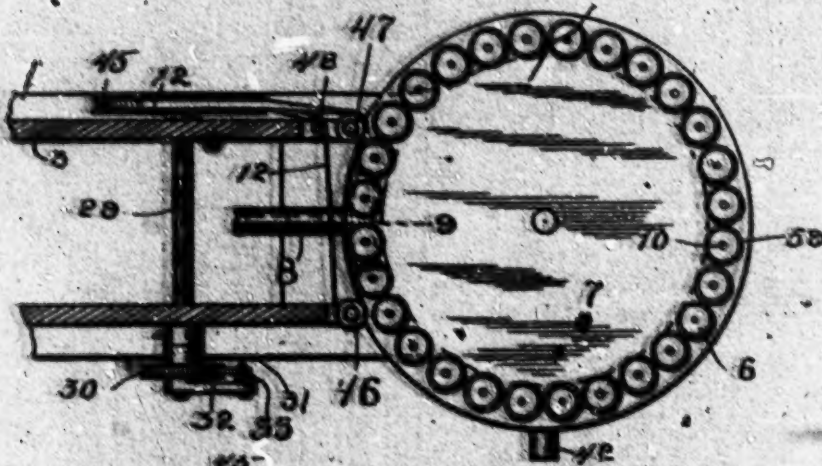


FIG. 4

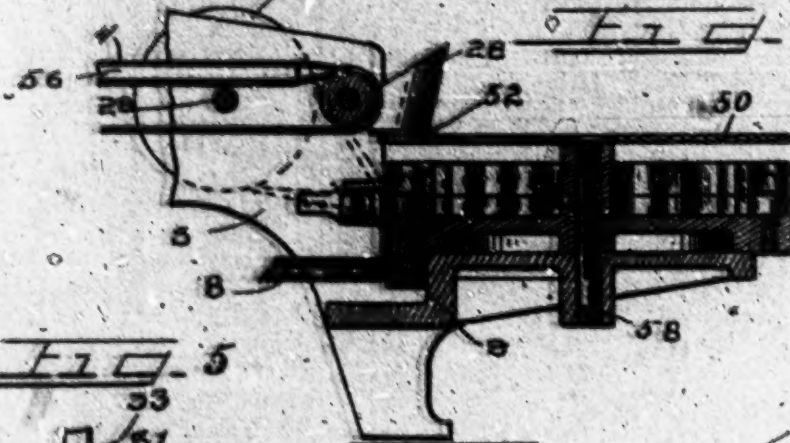


FIG. 5

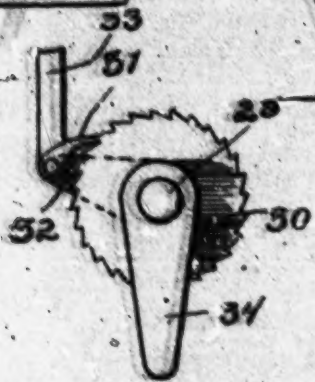
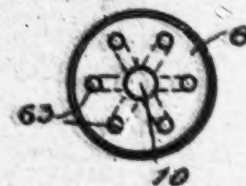


FIG. 6



FIG. 7



WITNESSES

J. H. Angell
J. H. Angell

INVENTOR

W. E. Williams,
by Wallace Wilson,
ATTY

W. E. WILLIAMS.

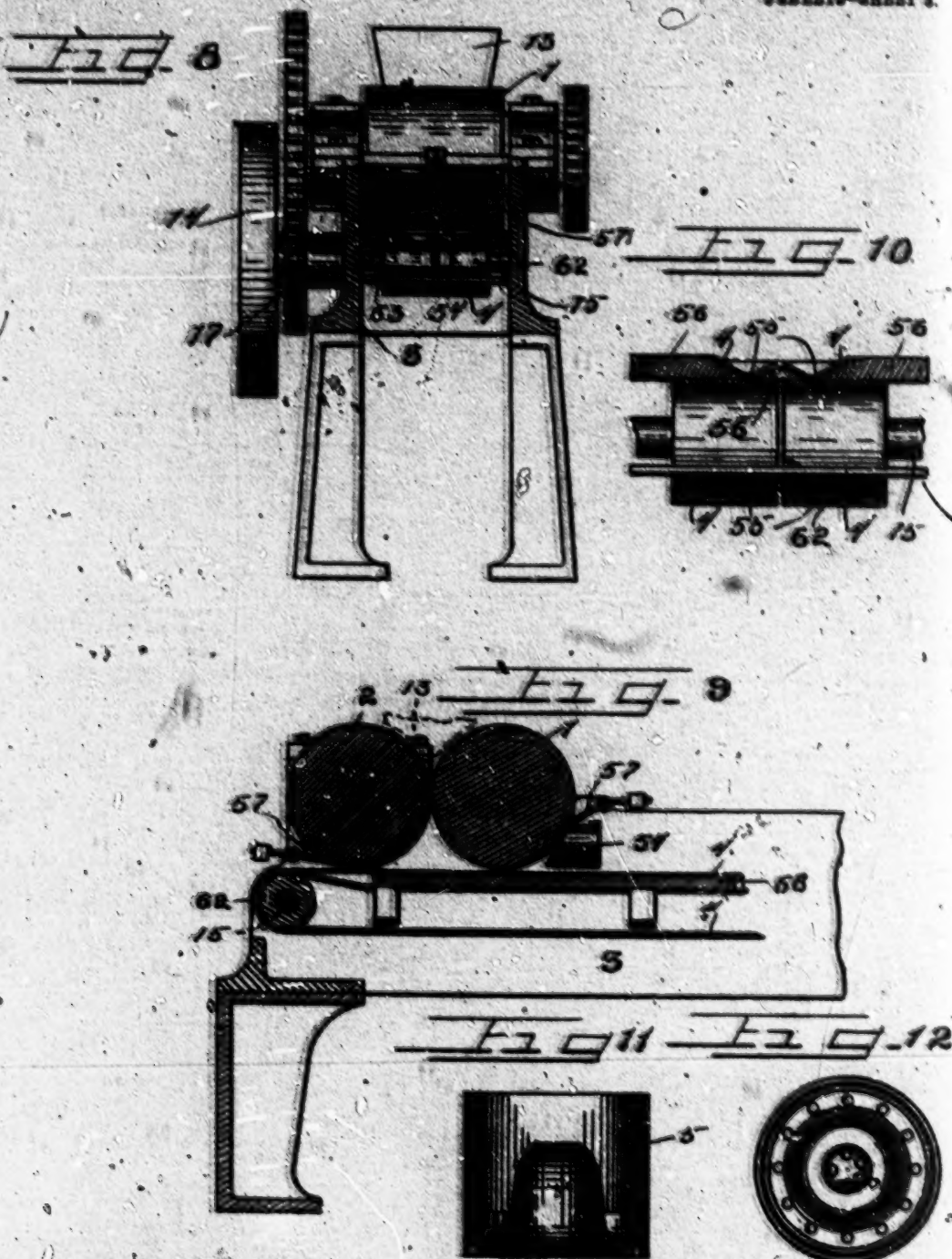
MACHINE FOR MAKING SHREDDED WHEAT BISCUITS.

APPLICATION FILED JUNE 30, 1906. RENEWED MAR. 18, 1909.

931,243.

Patented Aug. 17, 1909.

SHEET 2.



WITNESSES

J. H. Angell
 J. H. Angell

INVENTOR

W. E. Williams
 By H. H. Williams, Atty.

UNITED STATES PATENT OFFICE.

WILLIAM ERASTUS WILLIAMS, OF CHICAGO, ILLINOIS.

MACHINE FOR MAKING SHREDDED-WHEAT BISCUITS.

No. 981,243.

Specification of Letters Patent.

Patented Aug. 17, 1909.

Application filed June 30, 1904, Serial No. 267,757. Renewed March 12, 1909. Serial No. 484,576.

To all whom it may concern:

Be it known that I, WILLIAM ERASTUS WILLIAMS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Machines for Making Shredded-Wheat Biscuits, of which the following is a specification.

The object of my invention is to provide a desirable machine for making shredded wheat or other biscuits, and the invention consists in the devices set forth in the claims.

Reference will be had to the accompanying drawing in which—

Figure 1 is a plan view of the machine. Fig. 2 is a side elevation of the machine. Fig. 3 is a plan detail of the delivery end of the machine. Fig. 4 is a side sectional detail of the front end of the machine. Fig. 5 is a detail of parts of the timing device. Figs. 6 and 7 are details of the cup spindles. Fig. 8 is a sectional elevation on line 8—8 of Fig. 1. Fig. 9 is a vertical sectional detail through the shredding rolls. Fig. 10 is a transverse sectional detail showing the guides for the carrier belts. Figs. 11 and 12 are views of the baking cups.

I provide a shredding device of any suitable construction which I show in the drawing as made of rolls 1 and 2 mounted upon any suitable frame 3. The shreds are delivered upon shred carriers of any suitable construction, but I prefer to use the belts 4 which deliver the shreds into baking cups of forms 5 which are carried upon spindles 6 mounted to revolve in a carrier wheel 7 having a vertical axis 38 in the frame. An air suction is produced by any suitable means of exhaust (not shown) and is connected by a pipe 8 to a chamber 9 which is connected by cavities 10 and 63 through the spindles 3 to the inside of cups 5 to suck the shreds down into the cups when the cups are in position to be filled. The chamber 9 extends only under the cups that are being filled and the lower side of the wheel 7 fits as a cover over the top of chamber 9. In addition to the suction to place the shreds into the cups, I provide sets of tampers or packers 11 which reciprocate vertically, pushing the shreds into place in the cups as the shreds are delivered by the belts 4. The spindles 6 are made to revolve intermittently by a belt 12 while they are being filled. The carrier wheel 7 is made to move intermittently allowing a period of rest sufficient to fill the

cups. Thus the wheat or the suitable prepared stock from which the shreds are to be made is placed in the hopper 13 and the rolls convert it into shreds which are formed into shape in the cups 5 which are removed by hand, or other suitable means and fresh cups supplied in a similar manner.

The machine is driven by a belt wheel 14 driving a shaft 15 carrying a pinion 16 which drives a span gear 17 on the shaft of one of the rolls and the rolls are geared together by gears 18. The pulleys 62 on shaft 15 drive the belts 4 much faster than the lineal rate of delivery of the shreds whereby the shreds assume a straighter position on the belts and are discharged with impact into the forms.

The mechanism for moving the carrier wheel 7 the packers and the cup spindles 6 is driven by the gear 20 on shaft 21 on which there is a crank 22 which is connected by a link 23 to a walking beam 24, having an axis 25 on the frame of the machine. Walking beam 24 is provided with an arm 26 having apertures which carry the packers, the lower ends of which are guided by perforated blocks 27, which are supported by the curved hoppers or guide way 28, which directs the shreds into the cups as the shreds are delivered by belts 4. A shaft 29 and the fixtures thereon act as a timing device and it extends across the machine and is driven intermittently by ratchet 30 and pawl 31 carried by an arm 32 moved by a link 33 connected to walking beam 24. The shaft 29 carries a block 34 which when in an upward position engages a block 35 on an arm 36 pivoted at one end 37 to the frame of the machine and at the other end 38 connected to a link 39 connected to a bar 40 which is connected to crank 22. The bar 40 reciprocates horizontally with every stroke of the crank. And its outer end 41 rides freely upon roller 42 at all times save only when block 34 engages block 35 which engagement lifts the end 41 of bar 40 and causes the block 43 on bar 40 at its next stroke to engage one of the pins 44 on wheel 7 and move the wheel or carrier two spaces or two cups bringing two empty cups under the discharge of the belts and removing the two filled ones. Thus the timing of filling the cups is determined by the rate of revolution of the shaft 29 carrying its block 34, this may be varied by causing the pawl 31 to engage more or less teeth of the ratchet at a stroke which is accomplished

by moving the connection of the arm 33 into different holes in walking beam 24 giving more or less stroke to pawl arm 32. The shaft 29 carries a belt wheel 45 which drives belt 12 which is trained around suitable guide rollers 46, 47, and 48 bringing the belt 12 into engagement with the head block of cap spindles 6 thereby causing them and the cups mounted thereon to move at each intermittent movement of ratchet or timing shaft 29, which movement takes place while the packing pokers are above the cups 5, thereby not disturbing the shreds in the cups by the revolution of the cups. The pokers 11 slide loosely in their supports and go down by gravity thereby adjusting themselves to the mass of shreds as they accumulate. Weights 49 are provided to give proper thrust to the pokers. Above the cup spindles on the carrier wheel 7 there is a cutting disk 50 provided with apertures 51 over the cup spindles.

Mounted to slide on the top of cutting disk 50 there is fixed plate 52 to which the curved hoppers 28 are attached. The plate 52 and disk 50 act as a shear to cut off the shreds at each movement of the carrier with the cups. The cups 5 are perforated at the bottom to provide a connection to the suction chamber 9 through the cavities 10 and 63 of spindles 6. Whereby the suction can act on the shreds as they fall into the cups. Instead of suction I may use an air blast from above but I prefer to use the suction. Below the rolls 1 and 2 there are provided guide or deflecting plates 53 and 54 for directing the falling shreds upon the center of carrier belts 4. The belts 4 are made of two thicknesses, one on top of the other and the upper or outer one is the thinner and more flexible of the two and they are connected together by rivets 55 along a central line. Along the upper or carrying side of the belts there are provided guide boards 56, which extend inward between the parts of the belt causing the upper layer to assume the shape of a trough thereby holding the shreds in place on the belt and preventing thus displacement as they are carried along.

The rolls are provided with suitable adjustments to hold them in position to each other and also with suitable scrapers 57 to strip the shreds off them. The cups 5 are the subject of another patent and they are made in two pieces, the outer or shell piece sits over the top of the spindle 6 on to the shoulder 59, while the cone piece rests on the surface 60. Thus the cups are held upon the spindles, yet may easily be removed as there is clearance between the top of the cups and the under side of plate 50.

In place of the rolls for producing the shreds I may use any suitable shredding device or provide a suitable source of supply of the shreds in any manner.

What I claim is:—

1. The combination with devices for producing cereal shreds or filaments, of a series of laterally closed independent cups or forms, means for bringing said forms successively into position, and automatic means for filling each form with an independent mass of loose shreds from said devices while in such position.

2. The combination with a suitable form, of means for feeding long cereal shreds into said form, to fill the same gradually, and means for rotating the form upon its own axis during such feeding, whereby the long shreds are wound spirally in the form.

3. The combination with a series of suitable forms, of automatic means for bringing said forms successively, to rest in position for filling, means for rotating each form upon its own axis while so at rest, and means for delivering long cereal shreds in the form while it is so rotating; whereby each form of the series is filled with a nest-like body of spirally wound shreds.

4. The combination with a series of suitable forms, of automatic means for bringing the forms to rest successively in a predetermined position, means for rotating each form upon its own axis while it is in such position, means for continuously delivering cereal shreds in each form during such rotation, and means for cutting off the supply of shreds when the form is filled to the proper extent.

5. The combination with a suitable form, of means for progressively feeding cereal shreds into said form, and means for producing an air current through the form during such feeding, to gently urge the individual shreds toward proper position.

6. The combination with a suitable form, of means for progressively delivering in said form loose cereal shreds, and a packer arranged for gently pressing the shreds during such delivery.

7. The combination with a suitable form, of means for progressively delivering loose cereal shreds in said form, a packer arranged for gently pressing the shreds into place during such delivery and means for rotating the form while it is being filled.

8. Means for bringing cereal shreds from a source of supply, forms for receiving the shreds, packers for packing the shreds in the forms, and means for revolving the forms, and means for moving the forms in relation to the source of supply.

9. Means for bringing cereal shreds from a source of supply, forms for receiving the shreds, packers for packing the shreds in the forms, means for revolving the forms, means for moving the forms in relation to the source of supply, means for cutting off the shreds in the forms from the source of supply.

10. The method of forming biscuits of cereal shreds which consists of aggregating loose shreds and giving the mass a desired shape by gently pressing the shreds into a suitable form by means of a current of air.
11. The method of forming biscuits of cereal shreds which consists in progressively introducing the shreds into a suitable form and meantime creating an air current through the gradually increasing mass.
12. Means for supplying shreds, forms for receiving the shreds, an air current to place the shreds in the forms and packers to pack the shreds in the forms.
13. Means for supplying shreds, forms for receiving the shreds, an air current, and mechanical packers for placing the shreds in the forms, and means for revolving the forms.
14. Means for supplying shreds, forms for receiving the shreds, an air current and mechanical packers to place the shreds in the forms and means for moving the forms in relation to the source of supply.
15. Means for supplying shreds, forms for receiving the shreds, an air current and mechanical packers for placing the shreds into the forms and means for cutting off the source of supply from the shreds in the forms.
16. Means for supplying shreds, forms for receiving the shreds, an air current and mechanical packers for placing the shreds in the forms, means for moving the forms in relation to the source of supply, means for cutting off the shreds from the source of supply.
17. Means for supplying shreds, forms for receiving the shreds, an air current and mechanical packers for placing the shreds in the forms, means for revolving the forms in relation to the source of supply, means for cutting off the shreds in the forms from the source of supply.
18. Means for supplying shreds, forms for receiving the shreds, a guideway or hopper for directing the shreds into the forms, packers and an air current for placing the shreds in the forms.
19. Means for supplying shreds, forms for receiving the shreds, from the source of supply, a guideway or hopper for directing the shreds into the forms, means for packing the shreds in the forms and means for revolving the forms, and means for moving the forms in relation to the source of supply.
20. Means for supplying shreds, forms for receiving the shreds, a movable carrier for the forms, means for revolving the forms while on the carrier and means for packing the shreds in the forms on the carrier.
21. Means for supplying shreds, forms for receiving the shreds, a movable carrier for the forms, means for revolving the forms on the carrier, means for packing the shreds in the forms and means for cutting off the shreds from the source of supply.
22. A shredding device, a carrier for the shreds, forms for receiving the shreds from the carrier, said carrier moving faster than the shredding device, delivering the shreds drawn out in lines and when free from the shredder moving with impact thereby aiding in their packing in the forms.
23. A source of supply of the shreds, forms for receiving the shreds, the said forms mounted upon revolving spindles, said spindles mounted on a movable carrier, means for the revolving the spindles intermittently.
24. An apparatus of the class described, the combination with a suitable form having apertures in its walls, of means for delivering cereal shreds in the form, and means for simultaneously passing an air current through said apertures, substantially as set forth.
25. The combination with a suitable form having apertures in its walls, of means for delivering cereal shreds in said form, and means for withdrawing air from the space around the exterior of the form, substantially as set forth.
26. The combination with a rotary carrier, of a series of forms revolvably mounted in the carrier, means for rotating the carrier step by step, means for rotating certain of said forms while the carrier is at rest, means for progressively delivering cereal shreds to the rotating forms, and means for continuously urging the entering shreds toward the form walls, substantially as set forth.

Signed at Chicago June 12th 1905.

WILLIAM ERASTUS WILLIAMS.

Witnesses:

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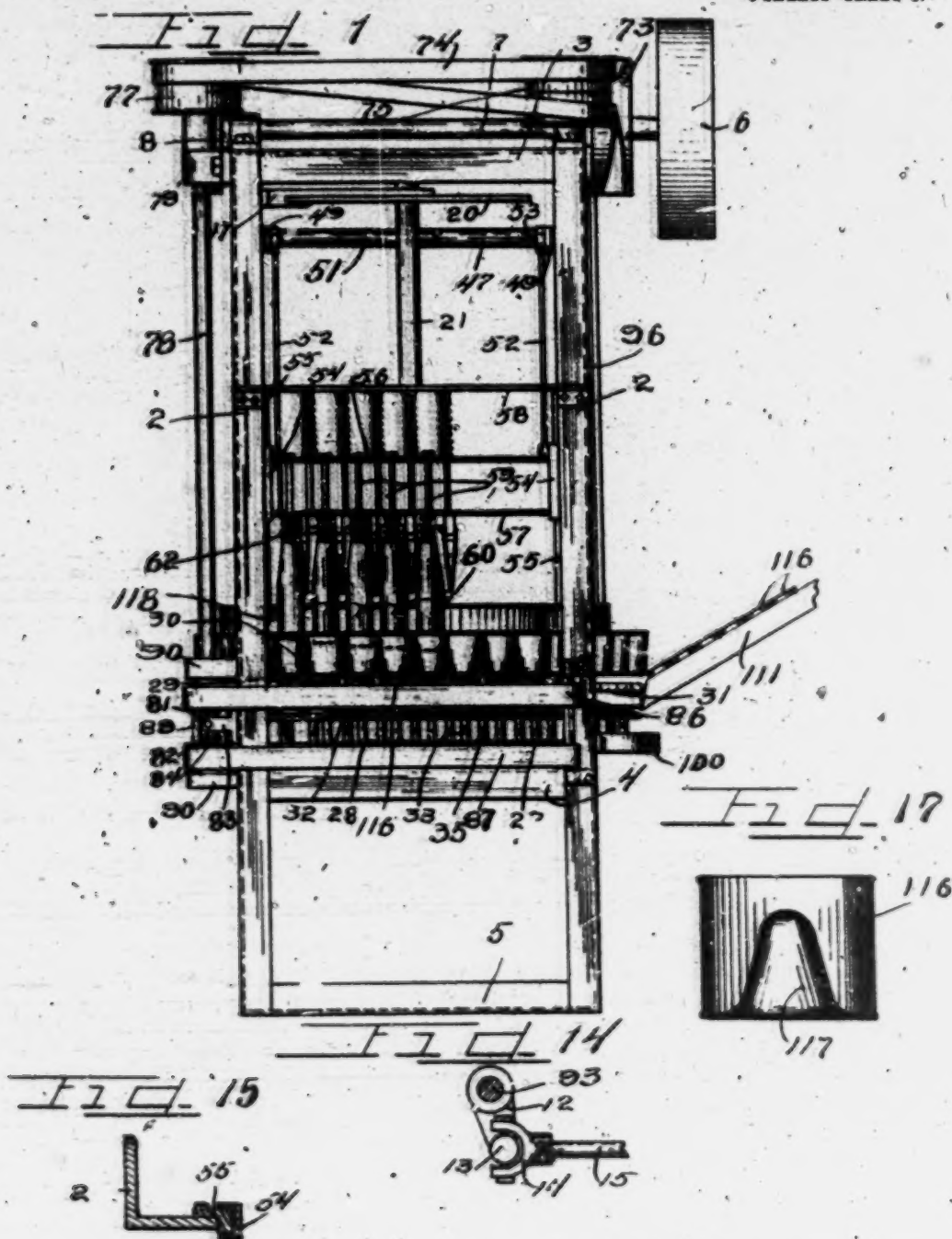
MACHINE FOR MAKING SHREDDED WHEAT BISCUITS.

APPLICATION FILED JAN. 22, 1908.

9'49,013.

Patented Feb. 15, 1910.

6 PAGES--PAGE 1.



Witnesses

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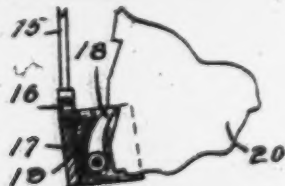
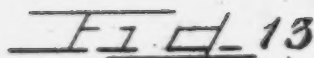
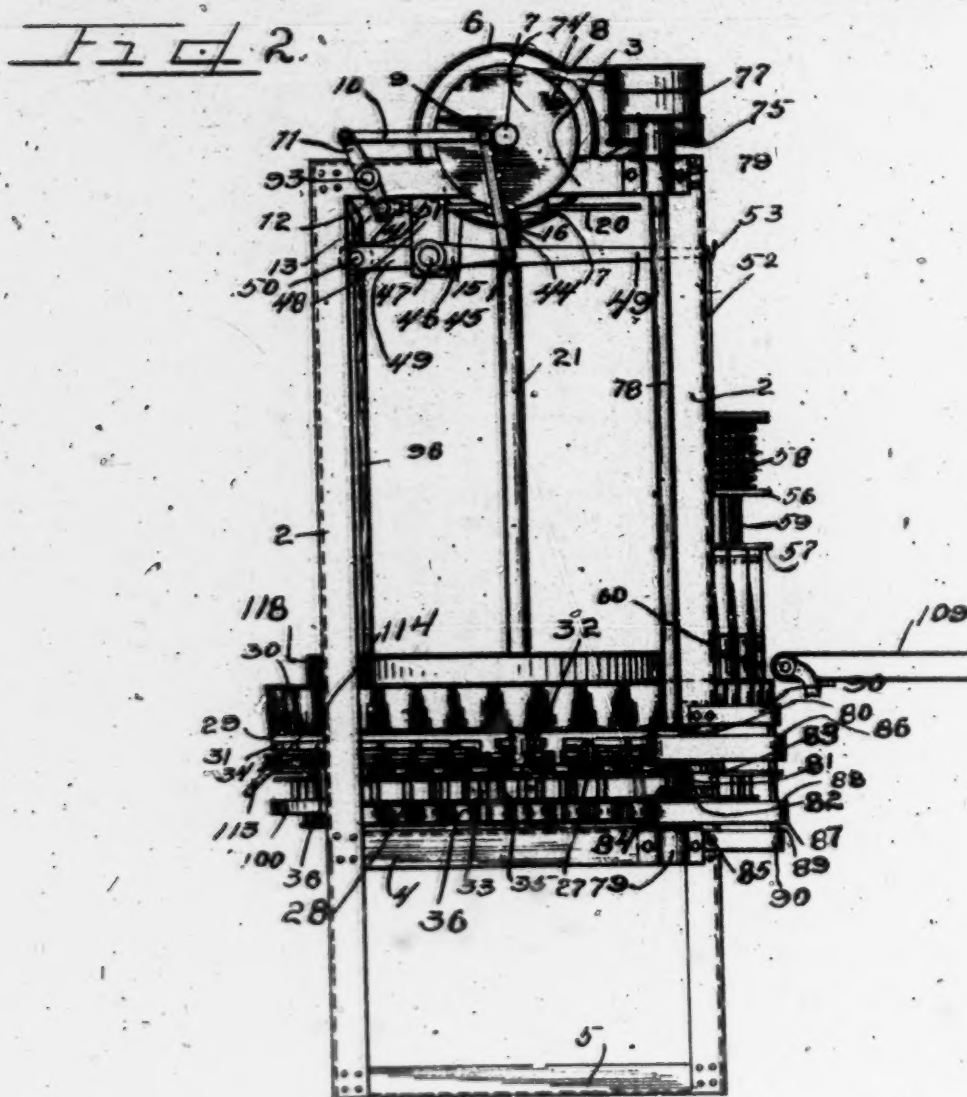
MACHINE FOR MAKING SHREDDED WHEAT BISCUITS.

APPLICATION FILED JAN. 29, 1908.

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Patented Feb. 15, 1910.

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Witnesses

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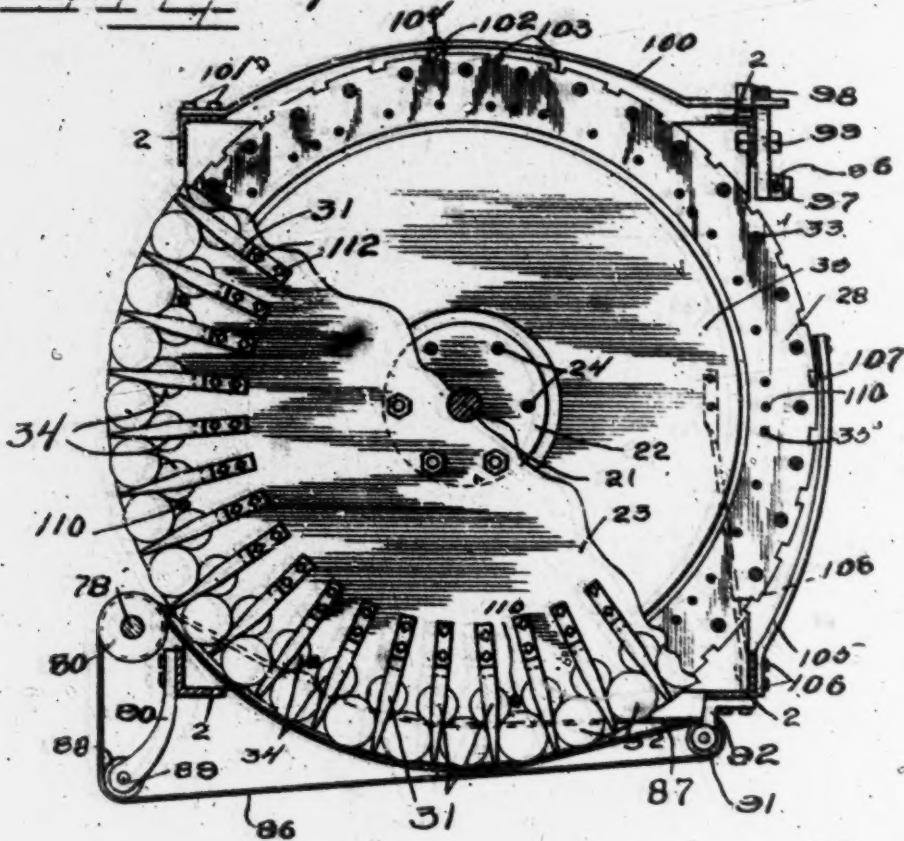
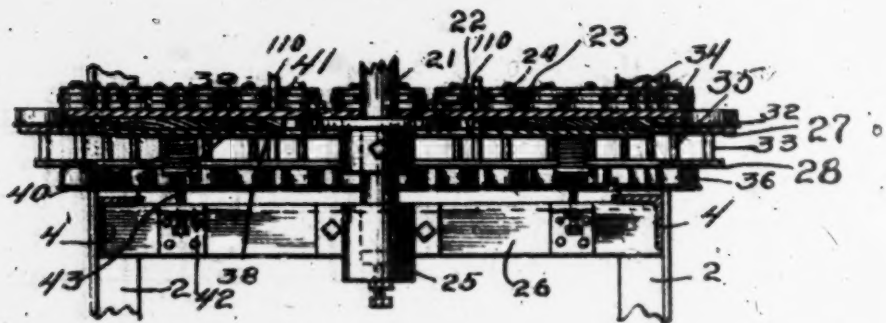
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W. E. WILLIAMS.
MACHINE FOR MAKING SHREDDED WHEAT BISCUITS.
APPLICATION FILED JAN. 29, 1903.

949,013.

Patented Feb. 15, 1910.

6 SHEETS—SHEET 4.

Fig 4Fig 5

WITNESSES

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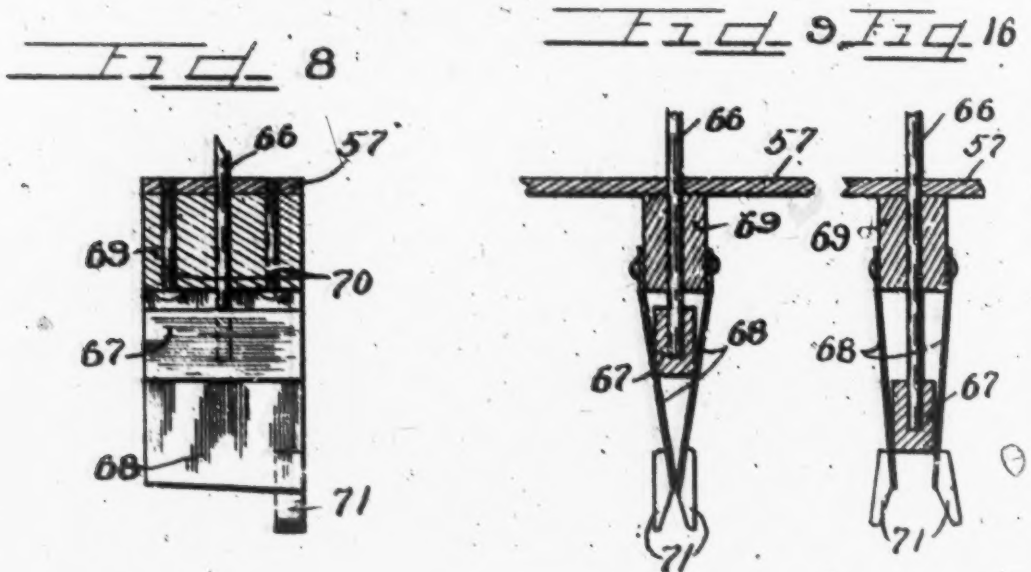
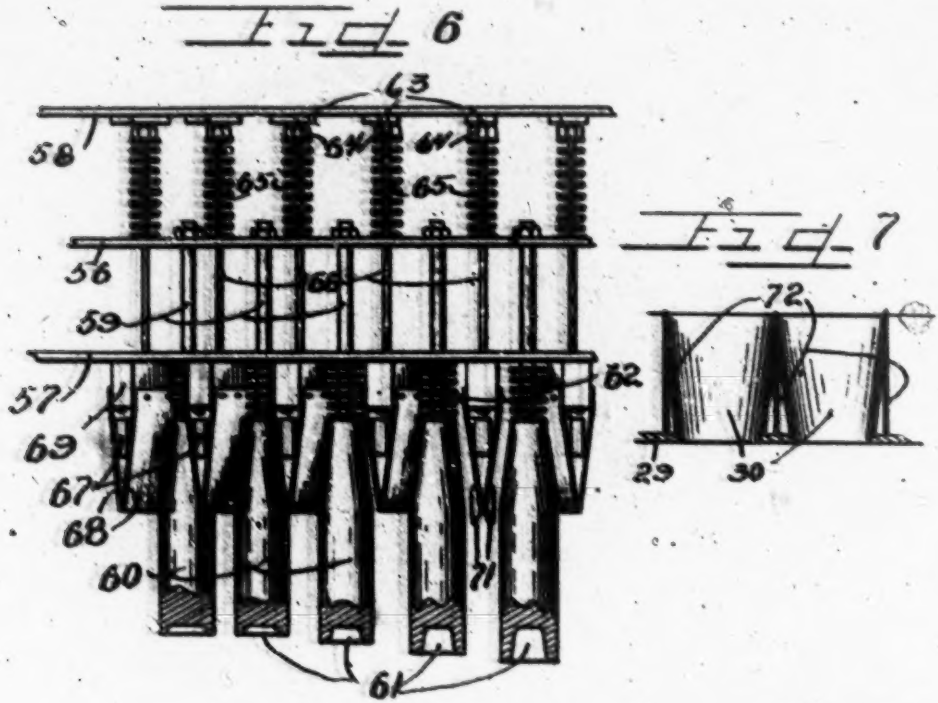
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W. E. WILLIAMS.
MACHINE FOR MAKING UNBREADED WHEAT BISCUITS.
APPLICATION FILED JAN. 29, 1906.

949,013.

Patented Feb. 15, 1910.

SHEETS-SHEET 1.



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UNITED STATES PATENT OFFICE

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MACHINE FOR MAKING SHREDDED-WHEAT BISCUITS.

949,013.

Specification of Letters Patent.

Patented Feb. 15, 1910.

Application filed January 29, 1908. Serial No. 413,379.

To all whom it may concern:

Be it known that I, WILLIAM ERASTUS WILLIAMS, a citizen of the United States, residing at Chicago, in the county of Cook and the State of Illinois, have invented a new and useful Improvement in Machines for Making Shredded-Wheat Biscuits, of which the following is a specification.

This invention has for its object to make automatically a cup-shaped biscuit or a round biscuit out of any shredded or fibrous material such as shredded wheat, grain, codfish or any other suitable material.

Reference will be had to the accompanying drawings in which:

Figure 1 is a vertical elevation of the machine on the side at which it receives the material that it operates upon to form the cup-shaped biscuits. Fig. 2 is a vertical elevation corresponding to the left side of Fig. 1. Fig. 3 is a top plan view with certain parts broken away to show those below. Fig. 4, is a plan sectional view with parts broken away as will be understood by reference to the corresponding parts in Figs. 1 and 2. Fig. 5 is a vertical sectional detail of certain parts of the base of the machine. Fig. 6 is a vertical detail of the packing plungers. Fig. 7 is a vertical detail of the receiving hoppers for the shreds. Fig. 8 is a sectional detail of one of the cutting plungers. Fig. 9 is a view similar to that of Fig. 8 but at right angles thereto. Fig. 10 is a vertical sectional view through the axis of the delivery belt. Fig. 11, on the same sheet with Fig. 3, is a vertical sectional detail. Fig. 12 (Sheet 3) is a vertical detail of the locking mechanism. Fig. 13 (Sheet 2) is a plan detail of the ratchet movement that drives parts of the mechanism. Figs. 14 and 15 on Sheet 1 are details that will be described later. Fig. 16 is a detail of the cutting plungers. Fig. 17 is a sectional view of the cups or forms. Fig. 18 is a detail view of a certain cross bar and blocks shown also in Figs. 3 and 6.

The machine is provided with a suitable frame made of members of angle section, 2, 3, 4, 5, and 26.

Fig. 17 is a cup or form into which the shreds are placed by the machine and which holds them till they are baked or dried and thereby set sufficiently to keep the shape given them by the form. This cup or form 116 is provided with a cone shaped central projection 117 in its bottom, around and

over which the shreds are placed by the machine in an interlacing manner extending upward, downward and obliquely of the cone shaped bottom and at the same time in a general direction around the cup and also inward and outward from the center toward the rim whereby the biscuit thus formed is bound together and yet the shreds are not packed tightly but left open and interstitial. The cups 116 are usually made of tin and are supplied to the machine from a magazine not shown, by a chute 111 and the function of the machine is chiefly to handle these cups and pack the material therein which material is delivered to the machine by the moving carrier belt 109 coming from a shredding machine or other suitable source of supply of the shreds. The shreds lying, as nearly as practicable, lengthwise of the carrier belt are discharged endwise into the hoppers 30 of the machine which hoppers 30 are arranged in a ring supported on a ring shaped disk 29 forming a part of a wheel carried on a vertical shaft 21. The hoppers 30 are spaced apart in the ring the right distance to suit the size of the cups 116 whereby the wheel carrying the hoppers 30 may receive a continuous line of cups 116 from the chute 111 and hold the cups 116 apart from each other by fingers 31 which are fastened by screws 112 to a plate 23 which is the main plate or body of the wheel and to which many other parts are fastened, which plate is fixed by screws 24 to a flange, 22, Fig. 4 fixed to shaft 21 supported in a step bearing 25 on cross member 26 of frame. The cups 116 are thus carried around by the wheel underneath the delivery of the carrier belt 109 and while underneath the said delivery receive a sufficient quantity of shreds to form the biscuits desired and are finally discharged by an arm 114 fixed by screws 115 to the frame 2 of the machine. A guide plate 113 directs the discharged cups into any suitable receiving device. The cups 116 are revolved during the time that they receive the shreds in order to interlace the shreds and to do this revolving there are provided rotating disks 32 upon which the cups 116 set as they are carried around by the wheel. These disks are seated in cavities in plate 23, and are supported by spindles 33 journaled in a lower disk ring 28 and also supported in an upper disk ring 27, both of which rings, 27 and 28, are fixed by studs 110 to plate 23. At the back of disks 32 and

above the plate 23 there are rollers 34 so arranged as to location that they engage the cups 116 as they set concentrically upon disks 32 and these rollers 34 are fixed upon shafts 35, journaled in plate 23, 27 and 28, and carrying drive pulleys 56 which are driven by a belt 87. A belt 86 engages the disks 32 and the cups 116 themselves so that the cups are engaged on the bottom and at 3 points on their sides by driving members so that they revolve during the time that they receive the shreds.

The shreds of grain are light and are usually long sometimes almost continuous strings, so that they do not drop readily into the cups 116 but must be forced down into place, and this is accomplished by a series of plungers or packers 60 mounted upon a vertically reciprocating cross head composed of the plates 56 and 57 connected together by members 54 which engage the guides 55 fastened to frame 2. The wheel which carries the cups is given an intermittent movement which permits the plungers 60 to descend into the cups 116 and force the shreds down out of the hoppers 30 into the cups or forms in the proper form desired and the ends of the plungers 60 are provided with cavities 61, which are so shaped as to give the proper form to the shreds in the cups at each stage of the filling of the same, the delivery belt 109 being wide enough to deliver into several hoppers 30 and cups 116 simultaneously and as the wheel moves by impulses the distance of one full space of a cup at a time each cup will receive several impacts of the plungers while being filled and some of the plungers are located beyond the points of delivery of the shreds to the cups to give a finish to the shape of the shreds in the cup which shreds are then properly biscuits. The plungers 60 are made round or cylindrical and engage the shreds on all sides of the central cone of the cup, at the same time preventing the drawing up of the shreds over the top of the cone on one side while they are being pushed down on the other side.

Since the shreds are often continuous strings and the supply on the carrier 109 is endless the shreds will extend over the top of one hopper 30 into that of its neighbor owing to the moving of the wheel carrying the hoppers past the points of delivery of the shreds to them. And to cut these shreds clear from hopper to hopper there are provided cutting walls 72 between the hoppers 30 and coacting therewith there are reciprocating cutting plungers composed of the cutting plates 68 fastened to blocks 69 which are fastened by screws 70 to plate 57 of cross head before mentioned that carries the packing plungers 60. The plates 68 on the descent of the cross head embrace each side wall 72 of hoppers 30 and thereby cut and

force down into hoppers any shreds that hang over the division walls 72 of the hoppers.

In the cutting of the shreds by the plungers as described some shreds will stick to the plates 68 and be lifted up as the plungers rise and to free these shreds there are provided the blocks 67 mounted upon rods 66 which slide through the plates 56 and 57 and terminate in a nut or cap 64 against which a spring 65 resting on plate 56 keeps blocks 67 in an upper position at all times save only when the cross head is at its upward limit of travel when the nuts or caps 64 engage fixed blocks 63 mounted upon a fixed cross bar 58 and thereby the blocks 69 are forced downward between plates 68 spreading them apart and stripping the shreds off their ends. (See Fig. 16.) On the return downward of the plungers the springs 65 withdraw blocks 67 to a normal position as shown in Fig. 9.

The inside lower corners of plates 68 of cutting plungers are provided with guide blocks 71 which insures proper registry of the cutting plungers with the cutting walls 72 of the hoppers to allow slight variations in the registry of the hoppers at each impulse of movement of the wheel carrying them.

The plungers or packers 60 are mounted upon rods 59 sliding in plates 56 and 57 of the cross head and springs 62 acting between the plungers 60 and plate 57 provide for an elastic contact with the shreds in the cups 116, preventing too great a mashing of the shreds in the cups and also insures against breaking the parts in the event of a derangement of the timing of the machine.

The machine is driven by a belt wheel 6 driving a shaft 7 which carries a crank plate 8 carrying a wrist pin 9 connected by a rod 10, to an arm 11, mounted upon a rocker shaft 98 supported by boxes fixed to frame 2 and rocker shaft 98 carries an arm 12 provided with a wrist pin 13 carrying a universal joint 14 connected by a rod 15 to a joint 16 on a rocker arm 17 journaled on vertical shaft 21 (on which is mounted the cup carrier wheel) and provided with a pawl 18 held by a spring 19 into contact with ratchet teeth of a large ratchet 20 whereby on each revolution of the belt wheel an impulse equaling the distance of one cup on the carrier wheel is given the cup carrying wheel and its parts. The impulses given the cup carrying wheel are quick and jerky and to insure close registration of the hoppers and cups with the packing and cutting plungers there is provided a locking catch or stop 102 (Fig. 4) fixed at 104 to a spring arm 100 screwed at 101 to frame 2 and this catch or stop 102 engages notches 103 in ring 28 and is released therefrom at the beginning of each movement of carrier

wheel by a cam block 98 (see Fig. 12), mounted upon a pin 99 and connected at 97 to a rod 96 connected to a wrist pin 95 in an arm 94 fixed on rocker shaft 93. Whereby at the back stroke of pawl arm 17 the catch 102 is released from the notches 103 in plate 98 of the carrier wheel then on the forward movement of arm 17 during which the carrier wheel is moving the catch 102 is allowed to come into engagement with notches 103 in time to prevent the movement of the wheel carrying it too far. Backlash is prevented by another spring catch 107 on arm 106 fixed at 106 to frame 2 and this catch is disengaged by the movement of the wheel itself.

The shock of stopping the carrier wheel is lessened by means of a friction disk brake 38 having friction blocks 39 placed up against the under side of the wheel plate 23 and held in elastic adjustment thereto by the springs 40 resting on blocks 41 and screws 43 in blocks 42 (see Figs. 4 and 5), and the disk is held against rotation by arms 108 shown only in dotted lines in Fig. 4. Thus by the above disk brake the wheel is prevented from too free a movement thereby saving some of the shock of stopping it.

The cross head carrying packing plungers and cutting plungers is vibrated by the former mentioned wrist pin 9 connected by a link 44 to a wrist pin 45 of an arm 46 connected to a rocker shaft 47 mounted in suitable bearings 48 fixed to frame of machine and rocker shaft 47 carries arms 49 connected at 53 to rods 52 connected to the cross head before mentioned. Consequently on each impulse of the cup carrying wheel the plungers descend to pack the material and cut it at the division walls of the hoppers. The plunger cross head is counter balanced on the rocker shaft 47 by a weight 51 fastened at 50 to arms 49.

Motion is given to the belts 86 and 87 by means of the belt wheel 73 engaging and driving the belt 74 which is trained around two guide pulleys 75 on a shaft 76 over a pulley 77 on a vertical shaft 78 which is supported in bearings 79 and carries a fixed pulley 85 on its lower end and also a bevel gear 84 which gear engages a gear 89 mounted upon a stud 88 and running idle thereon and engaging a gear 81 fixed to a pulley 80 which is loosely mounted on shaft 78 whereby shaft 78 drives pulley 85 in one direction and pulley 80 in an opposite direction.

The belt 86 before mentioned passes around pulley 80 and then over an idler 88 on a stud 89 in brackets 90, then around a pulley 91 supported by brackets 92 and then back along the carrier wheel rim engaging the tin cups or forms 116 and disks 32 and thereby rotating them back to and around the pulley 80 as described. The belt 87 passes around the pulley 85, then over an

idler 88 on stud 89 before mentioned, then around another idler supported in brackets 92 before mentioned and then back in contact with and rotating pulleys 36 thereby rotating rollers 34 and thence back to pulley 70 84 as mentioned. Thus as the carrier wheel presents the cups to be filled with shreds to form biscuits it brings the cups into contact with the belts as above described which revolve the cups all the time that they are receiving the shreds.

The hoppers 30 are connected to back flange plate 118 held down to ring 29 by rods 37 and this plate 118 prevents the discharge of the shreds from the delivery belt 80 109 beyond the hopper 30.

What I claim is:

1. In a machine of the class described, the combination of movable forms or molds in which the biscuits are molded, a carrier for the forms, devices for revolving the forms while in the carrier, a source of supply of the shreds delivering to the forms or molds, hoppers directing the shreds from the source of supply into the forms or molds, circular packing plungers for forcing the shreds into the forms, cutting devices for cutting the shreds between the hoppers and forms, packing plungers for giving shape to the biscuits after the required mass of shreds has been delivered to the forms, and discharging devices for discharging the forms containing the biscuits from the carrier.

2. In a machine of the class described, the combination of movable forms or molds in which the biscuits are molded, a carrier for the forms, devices for revolving the forms while in the carrier, a source of supply of the shreds delivering to the forms or molds, hoppers directing the shreds from the source of supply into the forms or molds, packing plungers for forcing the shreds into the forms, cutting devices for cutting the shreds between the hoppers and forms, packing plungers for giving shape to the biscuits after the required mass of shreds have been delivered to the forms, and discharging devices for discharging the forms containing the biscuits from the carrier.

3. The combination of forms for the biscuits to be made, a carrier for the forms, devices for automatically delivering the forms to the carrier, devices for giving the carrier an intermittent motion, a source of supply for the shreds, devices engaging the forms on the bottom and two sides to revolve them during the filling, reciprocating packing plungers for packing the shreds in the forms, reciprocating cutting plungers for cutting the shreds from the source of supply, and devices for removing the forms from the carrier.

4. The combination of molds for receiving the shreds, a carrier for the molds, hoppers mounted to move in time with the car-

rier for directing the shreds into the molds, reciprocating packing plungers passing down through the hoppers and packing the material into the molds, reciprocating cutting plungers for cutting the shreds between the molds, and discharging devices for removing the molds from the carrier.

The combination of a mold carrier, hoppers mounted to move with the carrier, and division walls between the molds adapted to coact with a reciprocating plunger in cutting the shreds between the molds.

6. The combination of a mold carrier, a series of hoppers adapted to move with the carrier and direct the supply of shreds to the molds, division walls between the hoppers adapted to coact with a reciprocating cutting plunger for cutting the shreds between the hoppers, and reciprocating plungers forcing the material into the molds simultaneously with the cutting of the shreds between the molds.

7. The combination of a carrier holding molds or pockets into which the shreds are deposited, division walls between the molds on the carrier, means for packing the material into the molds of the carrier, and reciprocating cutting plungers cutting the material at the division walls between the molds and means for revolving the molds.

8. The combination of a carrier wheel having pockets or receptacles for receiving material to be handled, devices for moving the carrier wheel intermittently, locking devices for locking the wheel in exact registration at each impulse of movement, reciprocating packing plungers engaging the material in the pockets at each impulse of the wheel, and cutting devices for cutting the material between the pockets at the time that the wheel is at rest.

9. The combination of a carrier for forms, said carrier provided with a seat for each form, each seat adapted to revolve and carry the form with it, rolls mounted adjacent to the seat and adapted to engage the form on the seat and assist in revolving the same, a source of supply for the material and means for moving the carrier with the forms across the source of supply.

10. The combination, of a carrier for forms, seats upon the carrier for holding the forms, said seats adapted to be revolved, rollers engaging the forms on the seats, and belts for revolving the rollers and forms.

11. The combination of a carrier for forms, seats upon the carrier for holding the forms and adapted to be revolved, rollers adapted to revolve the forms upon the carrier, belts for driving the rollers, seats and the forms, and reciprocating packing plungers for packing the material in the forms while the same are upon the seats.

12. The combination of a carrier carrying forms across a source of supply of ma-

terial, reciprocating packing plungers packing the material while it is coming from the source of supply and reciprocating cutting plungers for cutting the material between the forms, said packing and cutting plungers mounted upon the same moving cross head substantially as shown.

13. The combination of, a seat for holding a form, two rollers located above the seat and adjacent thereto whereby the said rollers may act upon a form located upon the seat, a belt passing on one side of the seat and engaging the seat and form located thereon and thereby holding the form back against the rollers, pulleys on the shafts of the rollers, a belt for driving the pulleys, and means for driving the belts.

14. The combination of a seat for holding a form, two rollers located above the seat and adjacent thereto whereby the said rollers may act upon a form located upon the seat, a belt passing on one side of the seat and engaging the seat and form located thereon and thereby holding the form back against the rollers, pulleys on the shafts of the rollers and a belt for driving the pulleys, means for driving the belts, and reciprocating packing plungers for packing the material in the forms.

15. The combination of a seat for holding a form, two rollers located above the seat and adjacent thereto whereby the said rollers may act upon a form located upon the seat, a belt passing on one side of the seat and engaging the seat and form located thereon and thereby holding the form back against the rollers, pulleys on the shafts of the rollers and a belt for driving the pulleys, means for driving the belts, reciprocating packing plungers for packing the material in the forms, and reciprocating cutting plungers for cutting the material between the forms.

16. The combination of a seat for holding a form, two rollers located above the seat and adjacent thereto whereby the said rollers may act upon a form located upon the seat, a belt passing on one side of the seat and engaging the seat and form located thereon and thereby holding the form back against the rollers, pulleys on the shafts of the rollers and a belt for driving the pulleys, means for driving the belts, reciprocating packing plungers for packing the material in the forms, reciprocating cutting plungers for cutting the material between the forms, and an ejecting device for removing the forms from the carrier.

17. The combination of a carrier for carrying movable forms across or past a point of delivery of the shreds, seats upon the carrier for holding movable forms, said seats adapted to revolve and hold a single form, fingers moving with the carrier and separating the forms from each other, rollers

mounted adjacent to the seats one for each form but located on a line between the seats and forms and of such diameter that each roller is adapted to engage two forms one on each adjacent seat, and means for revolving the seats and the rollers and thereby the forms.

18. The combination of a carrier for carrying movable forms across or past a point of delivery of the shreds, seats upon the carrier for holding movable forms, said seats adapted to revolve and hold a single form, fingers moving with the carrier and separating the forms from each other, rollers mounted adjacent to the seats one for each form but located on a line between the seats and forms and of such diameter that each roller is adapted to engage two forms one on each adjacent seat, means for revolving the seats and the rollers and thereby the forms, and means for packing the material in the forms and for cutting it between the forms.

19. The combination of a carrier for carrying movable forms across or past a point of delivery of the shreds, seats upon the carrier for holding movable forms, said seats adapted to revolve and hold a single form, fingers moving with the carrier and separating the forms from each other, rollers mounted adjacent to the seats one for each form, but located on a line between the seats and forms and of such diameter that each roller is adapted to engage two forms one on each adjacent seat, means for revolving the seats and the rollers and thereby the forms, means for packing the material in the forms and for cutting it between the forms, and means for ejecting the forms from the carrier.

20. The combination of a carrier carrying forms that are to give shape to the biscuits, seats carried with the carrier for holding the forms, means for revolving the seats and forms, fingers moving with the carrier for separating the forms from each other, hoppers moving with the carrier for directing the material into the forms, and reciprocating packing plungers for packing the material into the forms.

21. The combination of a carrier carrying forms that are to give shape to the biscuits seats carried with the carrier for holding the forms, means for revolving the seats and forms, fingers moving with the carrier for separating the forms from each other, hoppers moving with the carrier for directing the material into the forms, reciprocating packing plungers for packing the material into the forms, and reciprocating cutting plungers for cutting the material between the forms.

22. The combination of a carrier carrying forms that are to give shape to the biscuits, seats carried with the carrier for holding the forms, means for revolving the seats and

forms, fingers moving with the carrier for separating the forms from each other, hoppers moving with the carrier for directing the material into the forms, reciprocating packing plungers for packing the material into the forms, reciprocating cutting plungers for cutting the material between the forms, and devices for ejecting the filled forms from the machine.

23. The combination of a carrier carrying forms that are to give shape to the biscuits, seats carried with the carrier for holding the forms, means for revolving the seats and forms, fingers moving with the carrier for separating the forms from each other, hoppers moving with the carrier for directing the material into the forms, reciprocating packing plungers for packing the material into the forms, reciprocating cutting plungers for cutting the material between the forms, devices for ejecting the filled forms from the machine, with means for giving the carrier an intermittent motion.

24. The combination of a carrier carrying forms, that are to give shape to the biscuits, seats carried with the carrier for holding the forms, means for revolving the seats and forms, fingers moving with the carrier for separating the forms from each other, hoppers moving with the carrier for directing the material into the forms, reciprocating packing plungers for packing the material into the forms, reciprocating cutting plungers for cutting the material between the forms, devices for ejecting the filled forms from the machine, with means for giving the carrier an intermittent motion, said revolving means for the seats and forms revolving the same all the time that the forms are filling.

25. The combination of a carrier carrying forms to be filled across a source of supply of the shreds, hoppers located above the source of supply, division walls between the hoppers, and reciprocating cutting plungers composed of two members adapted to embrace the division wall on each side simultaneously and thereby strip the material from each side of the division wall.

26. The combination of a carrier carrying forms to be filled across a source of supply of the shreds, hoppers located above the source of supply, division walls between the hoppers, reciprocating cutting plungers composed of two members adapted to embrace the division wall on each side simultaneously and thereby strip the material from each side of the division wall, and reciprocating packing plungers acting on the material simultaneously with the cutting.

27. The combination of a carrier carrying forms to be filled across a source of supply of the shreds, hoppers located above the source of supply, division walls between the hoppers, reciprocating cutting plungers com-

posed of two members adapted to embrace the division wall on each side simultaneously and thereby strip the material from each side of the division wall, and guide blocks located on the plates of the cutting plungers whereby close registration with the division walls of the hoppers is secured.

28. The combination of a carrier carrying forms to be filled across a source of supply of the shreds, hoppers located above the source of supply division walls between the hoppers, reciprocating cutting plungers composed of two members adapted to embrace the division wall on each side simultaneously and thereby strip the material from each side of the division wall, and a stripper block for stripping the material from the plungers when the same retreat from the cutting.

29. The combination of forms to be filled, a source of supply for filling the material into the forms, a reciprocating cutting plunger for cutting the material between the forms, and a stripper for stripping the material from the cutting plunger which stripper is held normally out of action by a spring but is actuated positively at the upward limit of the plunger.

30. The combination of forms for receiving the material, a source of supply of the material, plungers for packing the material into the forms mounted in a manner to apply an elastic impact to the material, and plungers for cutting the material between the forms.

31. The combination of forms for receiving the material, a source of supply of the material, plungers for packing the material into the forms mounted in a manner to apply an elastic impact to the material, plungers for cutting the material between the forms, and hoppers for directing the material to the forms.

32. The combination of forms for receiving the material, a source of supply of the material, plungers for packing the material into the forms mounted in a manner to apply an elastic impact to the material, plungers for cutting the material between the forms, hoppers for directing the material to the forms, and means for revolving the forms.

33. The combination of forms for receiving the material, a source of supply of the material, plungers for packing the material into the forms mounted in a manner to apply an elastic impact to the material, plungers for cutting the material between the forms, hoppers for directing the material to the forms, and means for revolving the forms, said packing plungers made cylindrical and engaging the material on all sides of the form at the same time.

34. The combination of forms for receiving the shreds, a carrier for the forms,

means for revolving the forms, packing plungers for packing the material in the forms, said plungers mounted to give an elastic impact to the material in the forms, said plungers made cylindrical in form, whereby they act on all sides of the material simultaneously.

35. The combination of forms for receiving the shreds, a carrier for the forms, means for revolving the forms, packing plungers for packing the material in the forms, said plungers mounted to give an elastic impact to the material in the forms, said plungers made cylindrical in form whereby they act on all sides of the material simultaneously, and reciprocating cutting devices for cutting the material between the forms.

36. The combination of forms for receiving the shreds, a carrier for the forms, means for revolving the forms, packing plungers for packing the material in the forms, said plungers mounted to give an elastic impact to the material in the forms, said plungers made cylindrical in form whereby they act on all sides of the material simultaneously, reciprocating cutting devices for cutting the material between the forms, with devices for discharging the forms from the carrier.

37. The combination of a carrier carrying forms to be filled, a source of supply of material, devices for giving the carrier an intermittent motion, devices for locking the carrier at each impulse of motion with a brake for preventing excess movement of the carrier.

38. The combination of a carrier wheel for carrying forms to be filled, a source of supply of shreds, a ratchet movement for moving the wheel, a locking device for preventing excess movement of the wheel, reciprocating plungers for packing the material in the forms, and reciprocating cutting plungers for cutting the material between the forms.

39. The combination of a carrier wheel for carrying forms to be filled, a source of supply of shreds a ratchet movement for moving the wheel, a locking device for preventing excess movement of the wheel, reciprocating plungers for packing the material in the forms, reciprocating cutting plungers for cutting the material between the forms, and a discharging device for removing the forms from the carrier.

40. The combination of a vertical shaft, a carrier for forms carried by the vertical shaft, a horizontal shaft to which is applied the source of power, a ratchet wheel on the vertical shaft and a pawl moved by the horizontal shaft for moving the ratchet and vertical shaft and carrier, and cutting plungers mounted upon the vibrating cross head.

41. The combination of a vertical shaft,

a carrier for forms carried by the vertical shaft, a horizontal shaft to which power is applied, a ratchet wheel on the vertical shaft and a pawl moved by the horizontal shaft for moving the ratchet and vertical shaft and carrier, cutting plungers mounted upon the vibrating cross head, and means for revolving the forms carried by the carrier.

42. The combination of a vertical shaft, a carrier for forms carried by the vertical shaft, a horizontal shaft to which power is applied, a ratchet wheel on the vertical shaft and a pawl moved by the horizontal shaft for moving the ratchet and vertical shaft and carrier, cutting plungers mounted upon the vibrating cross head, and a secondary vertical shaft actuated from the horizontal shaft for revolving the forms carried by the carrier.

43. The combination of a vertical shaft, a carrier for forms carried by the vertical shaft, a power driven horizontal shaft, a ratchet wheel on the vertical shaft and a pawl moved by the horizontal shaft for moving the ratchet and vertical shaft and carrier, cutting plungers mounted upon the vibrating cross head, a secondary vertical shaft actuated from the horizontal shaft for revolving the forms carried by the carrier, and pulleys and belts driven from the secondary shaft for revolving the forms.

44. The combination of a vertical shaft, a carrier for forms carried and moved by the shaft, fingers division walls or pockets on the carrier for separating the forms, means for giving the vertical shaft and carrier an intermittent motion, means for locking the same at determined point, a source of supply for the material to be filled into the forms, and means for cutting the material between the forms.

45. The combination of a vertical shaft, a carrier for forms carried and moved by the shaft, fingers division walls or pockets on the carrier for separating the forms, means for giving the vertical shaft and carrier an intermittent motion, means for locking the same at determined points, a source of supply for the material to be filled into the forms, means for cutting the material between the forms, and means for ejecting the forms from the carrier.

46. The combination of a vertical shaft, a carrier for forms carried and moved by the shaft, fingers division walls or pockets on the carrier for separating the forms, means for giving the vertical shaft and carrier an intermittent motion, means for locking the same at determined points, a source of supply for the material to be filled into the forms, means for cutting the material between the forms and means for revolving the forms while being filled.

47. The combination of a vertical shaft, a carrier for forms carried and moved by the

shaft, fingers division walls or pockets on the carrier for separating the forms, means for giving the vertical shaft and carrier an intermittent motion, means for locking the same at determined point, a source of supply for the material to be filled into the forms, means for cutting the material between the forms, means for revolving the forms while being filled, and means for ejecting the forms from the carrier.

48. The combination of a carrier for carrying movable forms a source of supply for the forms, a source of supply for the material to be filled into the carrier forms, means for revolving the forms, while receiving the material, said revolving means actuating the forms during a part only of the time that said forms are in the carrier and said revolving means composed of belts that are automatically engaged and disengaged by the movement of the carrier, with a fixed arm discharging the forms automatically by the movement of the carrier when the same arrives at a given point of its carriage.

49. The combination of a carrier wheel for forms, actuated and carried, by a vertical shaft, a horizontal driving shaft connected to drive the vertical shaft and wheel through the medium of a ratchet and pawl movement, a rocker shaft driven by the horizontal shaft for driving the ratchet and pawl movement of the vertical shaft, locking devices connected to the rocker shaft for locking and unlocking the carrier wheel as driven by the ratchet movement.

50. The combination of a carrier wheel for forms actuated and carried by a vertical shaft, a horizontal driving shaft connected to drive the vertical shaft and wheel through the medium of a ratchet and pawl movement, a rocker shaft driven by the horizontal shaft for driving the ratchet and pawl movement of the vertical shaft, locking devices connected to the rocker shaft for locking and unlocking the carrier wheel as driven by the ratchet movement, and a secondary rocker shaft driven from the horizontal shaft for actuating a reciprocating cross head carrying packing plungers adapted to engage the material in the forms carried by the carrier.

51. The combination of a horizontal carrier for forms, composed of a wheel, a vertical shaft mounted in a suitable frame for carrying the wheel, hoppers mounted upon the wheel and moving therewith, revolving seats mounted below the hoppers and carried with the wheel, and a belt mounted to engage a section of said wheel's periphery and revolve the forms by the movement of the belt, said belt engaging successively the forms as the same are brought in contact with it by the movement of the wheel.

52. The combination of a horizontal car-

rier for forms composed of a wheel a vertical shaft mounted in a suitable frame for carrying the wheel, hoppers mounted upon the wheel and moving therewith, revolving seats mounted below the hoppers and carried with the wheel a belt mounted to engage a section of said wheel's periphery and revolve the forms by the movement of the belt, said belt engaging successively the forms as the same are brought in contact with it by the movement of the wheel, and a discharge mechanism for discharging the forms from the wheel by the movement of the wheel.

53. The combination of a horizontal carrier for forms composed of a wheel, a vertical shaft mounted in a suitable frame for carrying the wheel, hoppers mounted upon the wheel and moving therewith, revolving seats mounted below the hoppers and carried with the wheel a belt mounted to engage a section of said wheel's periphery and revolve the forms by the movement of the belt, said belt engaging successively the forms as the same are brought in contact with it by the movement of the wheel, and reciprocating packing plungers packing the material out of the hoppers into the forms.

54. The combination of a horizontal carrier for forms composed of a wheel, a vertical shaft mounted in a suitable frame for carrying the wheel, hoppers mounted upon the wheel and moving therewith, revolving seats mounted below the hoppers and car-

ried with the wheel a belt mounted to engage a section of said wheel's periphery and revolve the forms by the movement of the belt, said belt engaging successively the forms as the same are brought in contact with it by the movement of the wheel, reciprocating packing plungers packing the material out of the hoppers into the forms, and reciprocating cutting plungers for cutting the material between the forms.

55. The combination of a horizontal carrier for forms composed of a wheel, a vertical shaft mounted in a suitable frame for carrying the wheel, hoppers mounted upon the wheel and moving therewith, revolving seats mounted below the hoppers and carried with the wheel a belt mounted to engage a section of said wheel's periphery and revolve the forms by the movement of the belt, said belt engaging successively the forms as the same are brought in contact with it by the movement of the wheel, reciprocating packing plungers packing the material out of the hoppers into the forms, and reciprocating cutting plungers for cutting the material between the forms.

In witness whereof I have hereunto signed my name on this 23rd day of January, 1908.

WILLIAM ERASTUS WILLIAMS.

Witnesses:

JOHN GRANT,
B. ROGER.

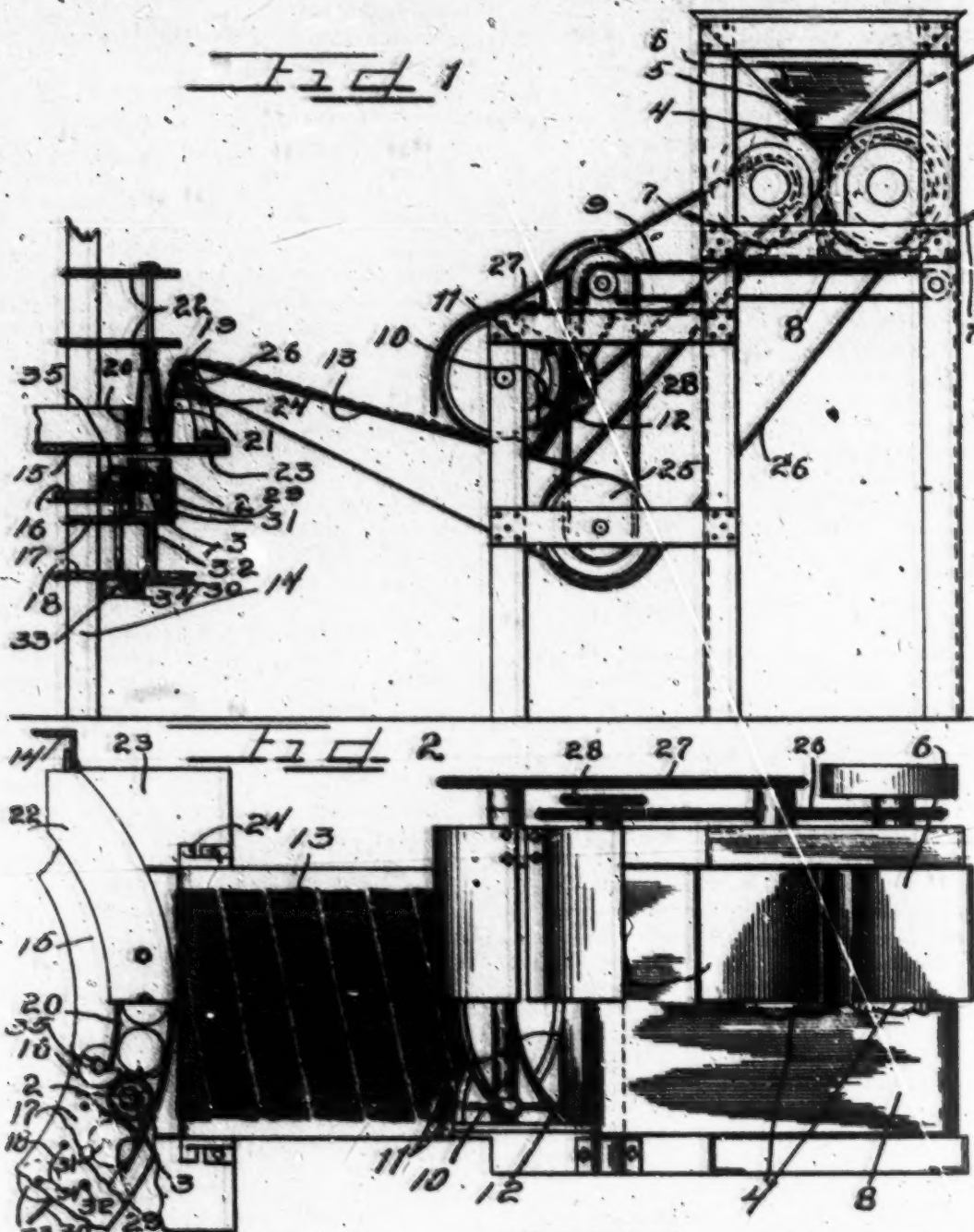
W. E. WILLIAMS.

MACHINE AND METHOD FOR MANUFACTURING SHREDDED WHEAT OUP BISCUITS.

APPLICATION FILED SEPT. 17, 1909.

991,584.

Patented May 9, 1911.



WITNESSES

J. H. Angell.
E. E. Overholt

INVENTOR

William E. Williams
by H. H. Caldwell, atty.

UNITED STATES PATENT OFFICE.

WILLIAM ERASTUS WILLIAMS, OF CHICAGO, ILLINOIS.

MACHINE AND METHOD FOR MANUFACTURING SHREDDED-WHEAT CUP-BISCUITS.

991,584.

Specification of Letters Patent.

Patented May 9, 1911.

Application filed September 17, 1906. Serial No. 453,459.

To all whom it may concern:

Be it known that I, WILLIAM ERASTUS WILLIAMS, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in a Machine and Method of Manufacturing Shredded-Wheat Cup-Biscuits, of which the following is a specification.

The object of my invention is to provide a machine and method whereby the shredded wheat cup biscuits may be made more uniform in size than has been heretofore possible with the machinery and methods heretofore known.

It has been difficult by machinery to make shredded wheat into the form of a cup shaped biscuit and get all the cups or biscuits of substantially the same size and density and when the cups so vary it is impossible to bake them on a commercial scale without burning the light weight ones before the heavy ones are fully baked and this causes a serious loss.

The shreds of wheat or other suitable material come from the shredding machine in a ribbon or mat of long threads that adhere together more or less irregularly and in separating the quantity for the different cups the interlacing of the shreds draws a larger portion from the delivery mechanism at some intervals than at others, thus producing the trouble. Further it is desirable that the cup biscuits be of even density on all sides of the rim as if one side is light it will burn on that side in baking. The long shreds hang together so that it is difficult by machinery to get them arranged evenly on all sides of the cup or baking forms to insure an even density of wall for the cup. But with the machinery and method here shown I overcome all the difficulties mentioned.

Reference will be had to the accompanying drawing in which:

Figure 1, is a side elevation of the machinery. Fig. 2 is a plan view with parts omitted for clearness of illustration.

In the drawing 2 indicates a baking form for a cup shaped biscuit which is a tin cup provided with a conical central projection 3 around which on the inside of the cup the shreds are disposed and held while being baked and the baking sets the shreds in form so that when they are discharged from the tin cups they retain the cup shape. This

baking cup or form is shown and described in some former applications of mine in relation to this art.

4 indicates a pair of shredding rolls which produce shreds of the prepared grain 5 delivered to the machine from hopper 6. Instead of grain this material may be of any suitable form or composition. In place of the rolls there may be used any suitable shredding or threading device.

The material is removed from the rolls by the scrapers 7 and it falls in more or less long continuous shreds onto the carrier belt 8 which delivers them continuously in a mat or ribbon 9 to a rotary cutting device 10 provided with spiral cutting blades 11 working against a stationary knife 12 which cut the shreds into short lengths which then fall upon a carrier belt 13 which carries the cut material to the cup forming machine 14. This cup forming machine or cupping machine is the subject of another application already on file. This cupping machine consists of a carrier for the tin cups or forms of any suitable construction but I prefer to use a wheel here shown in section and constructed of plates, 15, 16, 17 and 18 secured together and mounted upon an axis not shown in the drawing and the wheel or carrier carries the tin cup forms past the delivery end 19 of the carrier belt 13.

Fixed to and moving with the form carrier there are a series of hoppers 20 which direct the discharge of the material as delivered by belt 13 into the tin cups or forms. Packing plungers 21 carried on a cross head 22 actuated to reciprocate in any suitable manner are provided to pack the material as it is delivered into the forms, or cups 2. The cups or forms 2 are revolved while being filled with the shreds by means of traveling belts 29 and 30. Belt 29 comes in contact with the cup or form itself and also with a series of disks 31 upon which forms 2 rest. Disks 31 are mounted upon spindles 32 revolving in apertures in the plates of the wheel or carrier. Belt 30 revolves rollers 33 on spindles 34 carrying rollers 35 which come into contact with the cups or forms 2 and assist in revolving them while the same are being filled. Any suitable means may be employed for driving these belts and any suitable means may be employed for revolving the cups or forms 2 while being filled. The stationary plate 23 supports the bearings 24 for the roller 26 over which the car-

rier belt 13 passes at the cupping machine but any suitable means of support for these parts may be used. Belt 14 passes over roller 25 and is driven thereby and roller 25 is driven by a chain 26 from the shredding rolls. The cutting device 10 is driven by a chain 27 from one of the shredding rolls. The carrier belt 8 is driven by chain 28 from the shaft of roller 25. Any suitable means may be used to drive these several mechanisms.

The operation is as follows: The material is reduced to webs or ribbons of shreds by the rolls and these webs or ribbons are then cut into short lengths or disconnected sections by the cutting device and it is then packed into the forms and while therein baked or dried sufficiently to retain the shape assumed in the forms. The separated and as it were disconnected shreds can thus be made to fill the cups or forms in approximate uniform degree of density and yet there is a sufficient degree of interlacing of the shreds to cause the cup biscuit to hang together when it is baked.

My invention is adapted to be used with any suitable cereal product and is not limited to wheat shreds although at the present time I prefer to use the wheat shreds but do not limit my invention to wheat.

While I have described a cup shaped shredded biscuit as being made by the method and machinery described herein, the same method and machinery is exactly adapted to make a round biscuit and other suitable shapes. Therefore, I have not limited myself to cup shape in the claims hereof.

What I claim is:

1. The combination with means for forming a ribbon-like mass of approximately parallel shreds, of means for dividing the shreds into short lengths, and means for rearranging the short shreds in biscuits of suitable form and giving them a multiplicity of widely divergent directions.

2. The method of making shredded biscuits which consists in forming the material into a mat of long moist shreds, dividing the mat into short lengths, rearranging the short shreds of the sections among themselves and forming the shreds of neighboring sections into a mass of new shape, and removing the moisture from the mass.

3. The method of making shredded biscuits which consists in forming the material into long moist shreds, dividing the shreds into short lengths, re-arranging the short shreds among themselves giving them new relative directions and forming them into

masses of new shape and volume, and baking the masses.

4. The combination with devices for shredding material and delivering the shreds in a continuous mat, of means for cutting the mat into short sections, biscuit forms, and means for rearranging the short shreds by relative longitudinal and other displacements, in said forms.

5. The combination with shredding devices, of means for dividing the shreds delivered thereby into short lengths, means for rearranging and combining shreds of neighboring sections into which the shreds are divided to form masses of new shape, and means for condensing the new masses during their formation.

6. The combination of, means for forming material into shreds, means for cutting the shreds into short lengths, means for placing the cut shreds in forms, means for packing the shreds in the forms, means for revolving the forms.

7. A source of supply of the shreds, a revolving cutter for cutting the shreds into short lengths as they come from the source of supply, means for depositing the shreds in forms, means for revolving the forms while the shreds are being deposited, and means for packing the shreds into the forms.

8. The combination with a source of supply for shreds, of a carrier removing a continuous mass of shreds from said source, means for dividing said mass transversely into short lengths, forms adapted to receive and re-shape masses of the short shreds, means for recombining the short shreds of the masses in said forms and readjusting them relatively by longitudinal and other movement, and means for gently compacting the shreds as they are received in the forms.

9. The method of making shredded cereal biscuits which consists in forming the material into a ribbon-like mass of approximately parallel shreds, dividing the mass transversely into segments not materially longer than the diameter of the desired biscuits, and re-arranging the shred segments in biscuits having their constituent shreds non-parallel and running in various wide-divergent directions.

In witness whereof, I have hereunto subscribed my name in the city of Chicago, on this 3rd day of September, 1908, in the presence of two subscribing witnesses.

WILLIAM ERASTUS WILLIAMS.

Witnesses:

W. O. BREWSTER,
JOHN GRANT.



W. E. WILLIAMS.

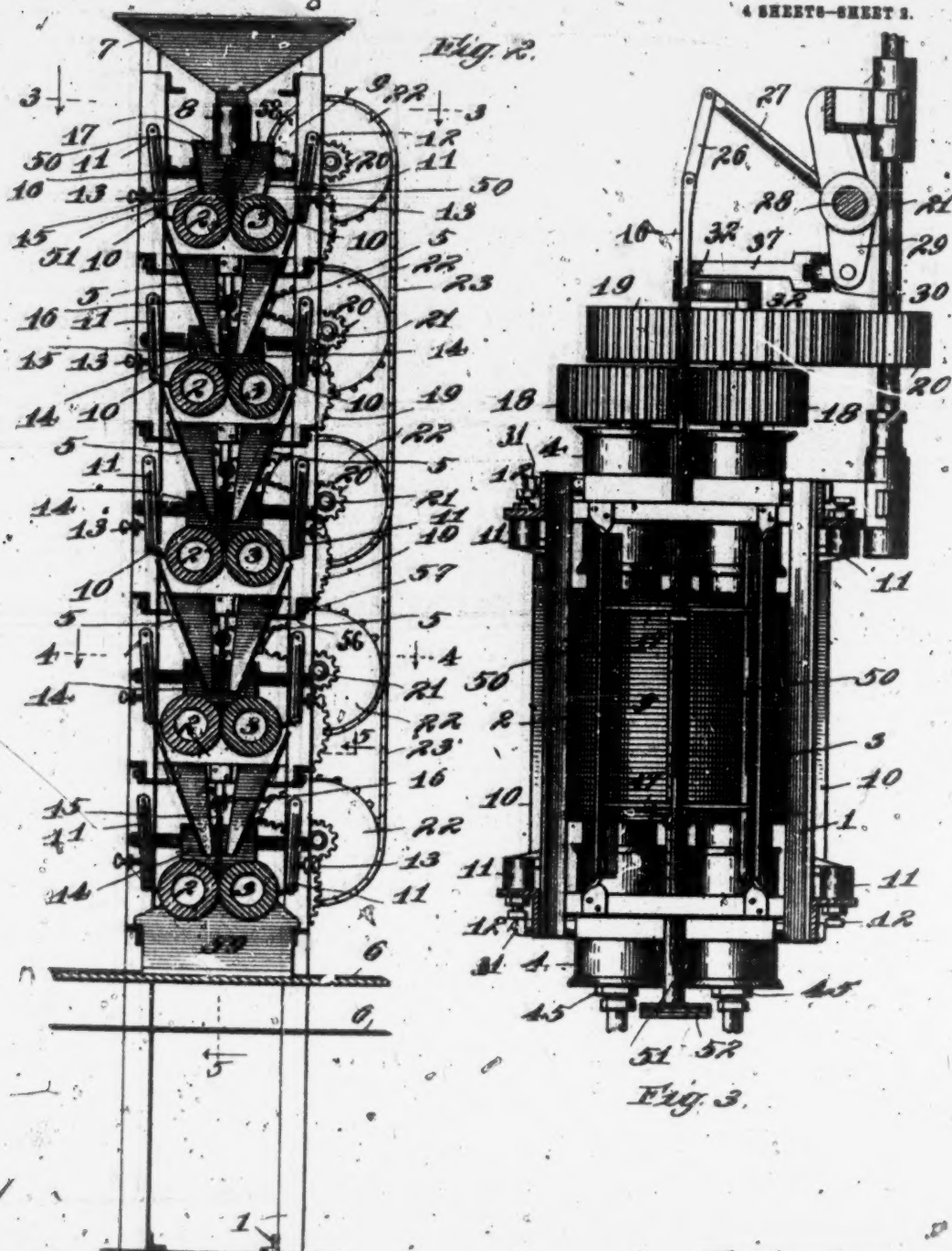
MACHINE FOR CONVERTING FOOD MATERIALS INTO SHREDS OR FIBERS.

APPLICATION FILED OCT. 1, 1907.

1,024,168.

Patented Apr. 23, 1912.

4 SHEETS-SHEET 1.



Witnesses:

J. A. Padenchiff
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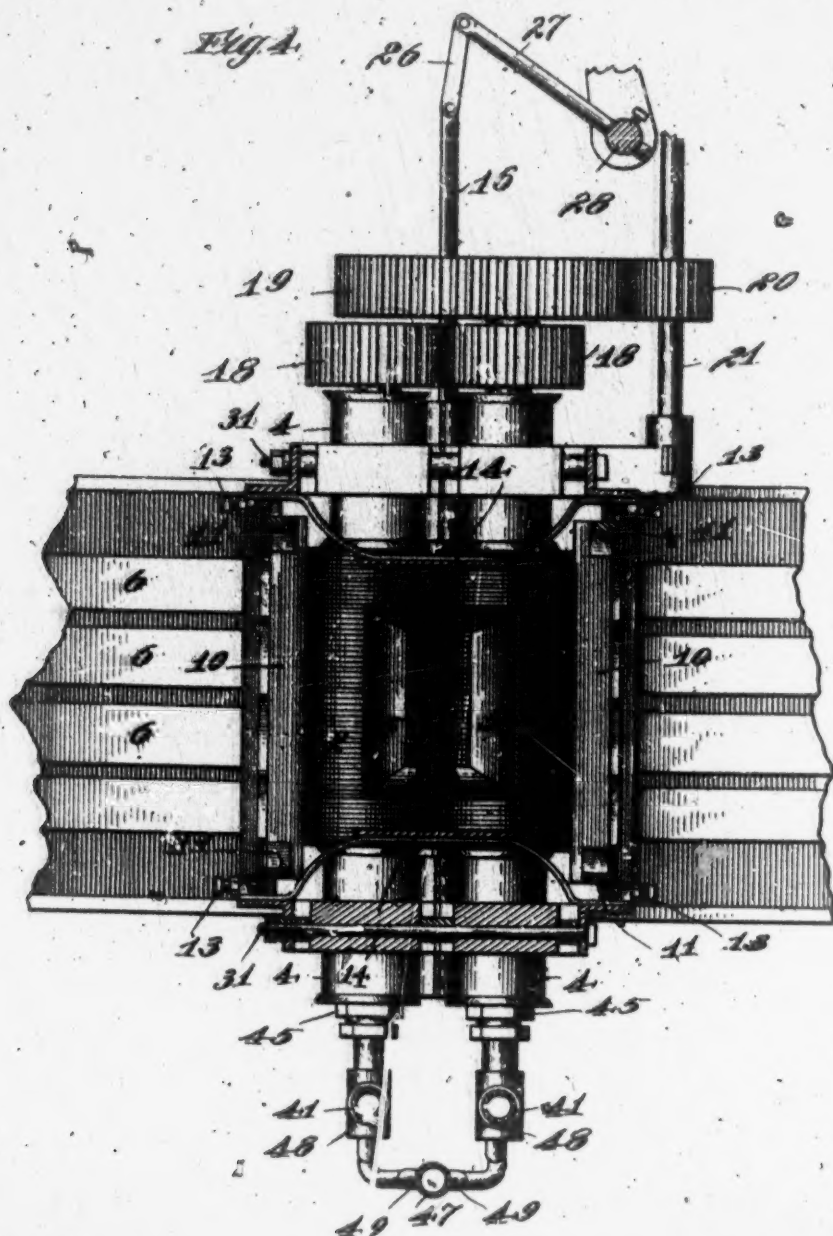
MACHINE FOR CONVERTING FOOD MATERIALS INTO SHREDS OR FIBERS.

APPLICATION FILED OCT. 1, 1907.

1,024,168.

Patented Apr. 23, 1912.

4 SHEETS—SHEET 3.



Witnesses:

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Inventor:

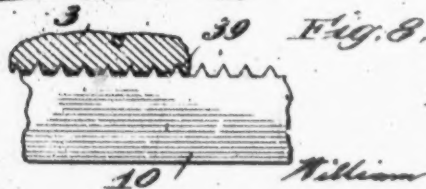
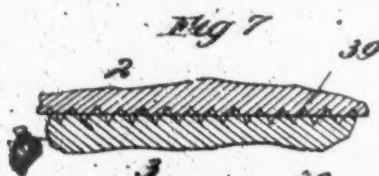
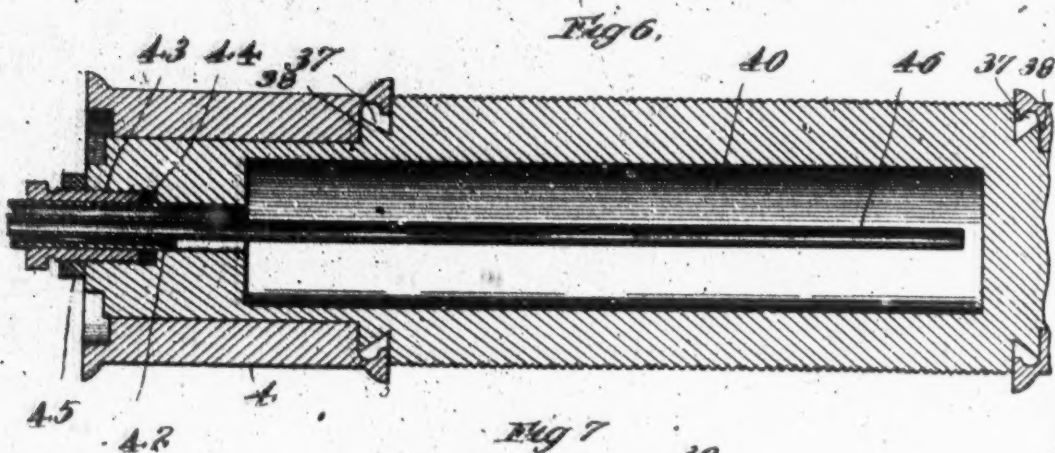
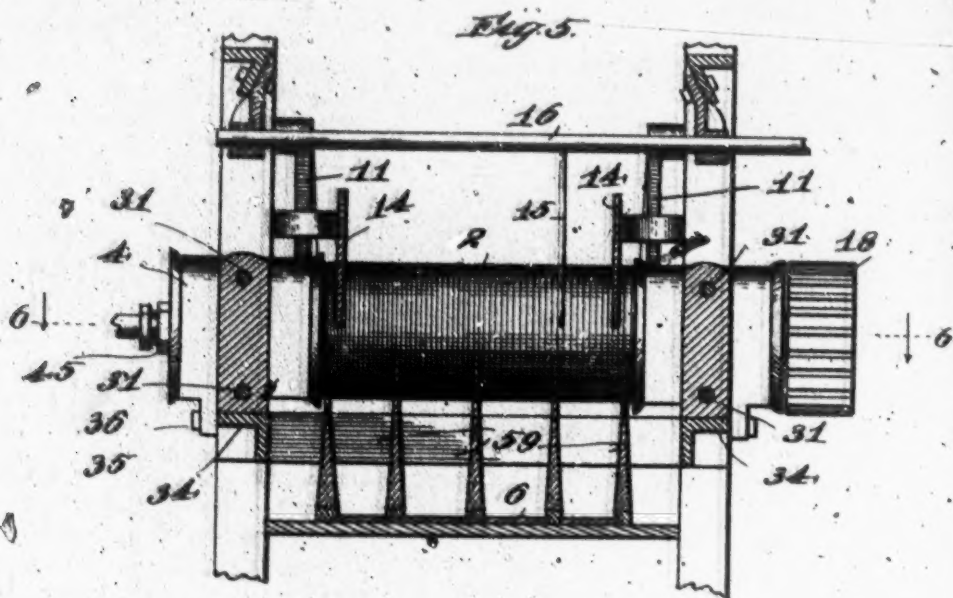
William E. Williams,
by
Hallowell Greene,
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W. E. WILLIAMS.
MACHINE FOR CONVERTING FOOD MATERIALS INTO SHREDS OR FIBERS.
APPLICATION FILED OCT. 1, 1907.

1,024,168.

Patented Apr. 23, 1912.

4 SHEETS-SHEET 4.



Witnesses:

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R. Craig Greene

Inventor

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UNITED STATES PATENT OFFICE.

WILLIAM E. WILLIAMS, OF CHICAGO, ILLINOIS.

MACHINE FOR CONVERTING FOOD MATERIALS INTO SHREDS OR FIBERS.

1,024,168.

Specification of Letters Patent.

Patented Apr. 23, 1912.

Application filed October 1, 1907. Serial No. 395,347.

To all whom it may concern:

Be it known that I, WILLIAM E. WILLIAMS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Converting Food Materials into Shreds or Fibers, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to machines for converting cereal grains, dough, or other suitable materials into shreds, fibers, or filaments, and the general object is to produce a filamentary product differing in character from any that have been produced by other machinery.

In the accompanying drawings, Figure 1 is a side elevation of the machine. Fig. 2 is a sectional end elevation of the same apparatus. Figs. 3, 4, 5 are sections on the lines 3-3, 4-4, 5-5, respectively, of Fig. 2. Fig. 6 is a horizontal section through a certain roll and its bearings. Fig. 7 is an enlarged sectional view showing two grooved rolls in contact. Fig. 8 is a sectional detail showing a scraper in contact with its roll.

In general terms, the apparatus consists of grooved rolls arranged to co-act in pairs, one pair above another, in the same plane, each pair receiving material from the next pair above, and the lowest pair delivering the product to a conveyor, and the apparatus including driving, feeding, guiding, roll-cooling, product-dividing, and various adjusting devices.

In the several figures, 1 represents a suitable upright frame in which are mounted, one above the other in the same plane, five pairs of hollow, circumferentially grooved rolls 2, 3, connected by gears 18 to rotate with equal circumferential speed. All the rolls 3 have upon their shafts, respectively, equal gears 19, and these are driven by equal pinions 20, one of which is mounted on a main shaft 24 driven in this instance by a power pulley 25, while the others are mounted on parallel counter shafts 21 driven from said power shaft by sprocket wheels 22 and chain bolts 23. Each roll is provided with a series of circumferential V-shaped grooves 39 (Fig. 7) a little narrower than the space between them and the grooves of each roll

being opposite the ungrooved spaces on the companion roll, as shown. At each end, beyond the grooves just mentioned, the rolls are turned down to form circumferential recesses 37, and beyond these are further turned down to form cylindrical bearing portions having at their inner ends shoulders 38. These bearing portions fit in bearing blocks 4 against which the shoulders abut and which are provided at their inner ends with circumferential recesses to co-act with the recesses 37 and prevent oil from passing to the grooved portions of the rolls. The blocks 4 for the two roll shafts are independently formed and mounted in the frame, one at least being slidable, with a block between them and are connected and drawn together by bolts 31 (Fig. 4). The rolls of each pair are in close contact so that practically no material, other than such as may lie in the grooves, can pass between them, and hence when they are once properly adjusted in contact the blocks are rarely moved laterally although obviously adjustment may be readily made. The bearings are further provided with lugs 35 and bolts 36 which secure them to the frame member 34 and permit slight endwise adjustments in the manner just mentioned.

In operation the rollers may become somewhat heated, and the heat being objectionable when certain materials are used provide for water-cooling the rolls. To that end they are each provided with an internal cavity 40 (Fig. 6) to which water is supplied by a pipe 41 connected with a thimble 42 working in the end of the roll in a gland consisting of the threaded sleeve 43, packing 44 and lock-nut 45. The water entering through the thimble passes out through a smaller axial pipe 46 leading through a suitable fitting or coupling 48 to a discharge pipe 47. Parts of the pipe 41 and part of each pipe 46, near their entrance at 49 to the pipe 47, are flexible so that adjustments or other slight movements of the rolls require no adjustment of the pipes.

The material or stock is placed in a hopper 7, above the upper rolls, whence it falls through a preferably flexible spout 8 into second hopper 9 closely fitting upon the upper rolls and having ends 17 adjustable toward and from the middle of the rolls to

vary the length of the hopper and effective length of the rolls, thereby controlling the amount of material which passes through the first set of rolls, and which should vary with varying materials. The sides 50 of the hopper (Fig. 3) are fixed to the frame and its ends are carried upon right threaded and left threaded portions of a screw 51 mounted in the frame and rotated by a chain bolt 53 passing over a sprocket wheel 52 upon the shaft 51 and a sprocket wheel 54, the adjusting power being applied by the operator.

As the material falls from each set of rolls to the next, it is guided to the middle portion of the rolls by oppositely faced converging spouts 5 and is spread along the rolls by a bar 15 fixed to a horizontal reciprocating rod 16 (Fig. 3) connected by a link 26 to an arm 27 projecting from a vertical shaft 28 which is rocked back and forth by the shaft of the roller 3 acting through a crank 32, pitman 37, and link 30 pivotally connected to an arm 29 projecting from the rock-shaft. The material thus distributed along the rolls is prevented from falling from their ends by fenders or plates 14, supported from the frame a little beyond the path of the agitating or spreading bar. As the spouts 5 need frequent cleaning, they are fixed in place by clips 56 secured to the frame by thumb-screws 57 and are thus readily removed and replaced. Any material that may adhere to any of the rolls is removed by one of several scrapers 10 fixed to arms 11 pivoted at 12 to the frame and adjusted by thumb screws 13.

Below the lower rolls are fixed parallel dividing blades or partitions 59 laterally grooved at the bottom so that they may overhang the edges of parallel conveyer belts 6 and at their upper sides having sharp knife edges to fit around the lower sides of the rolls. The material is thus divided part falling on each belt, and owing to its being compelled to adjust itself at a little distance from the edges of the belts it is practically prevented from afterward falling therefrom.

What I claim:

1. In apparatus of the class described, the combination with a pair of shredding rolls, of a second pair of shredding rolls delivering shreds, in the bight of the first pair, and means for arranging, delivered shreds across the grooves of the rolls first mentioned.

2. In a machine of the class described, the combination with pairs of co-acting shredding rolls mounted one pair above another in the same plane and one roll of each pair having circumferential grooves spanned by ungrooved portions of its companion, of a hopper above the first pair, spouts for directing shreds from each pair to the succeeding pair, and agitator arms arranged to move back and forth longitudinally above

each pair of rolls below the first to distribute the shreds across the grooves.

3. The combination with a series of pairs of co-acting shredding rolls, a feeding hopper, and a receiving hopper, all mounted one above the other approximately in the same vertical plane, of a reciprocating distributing device moving above the central portion of the bight of the upper rolls, and means for limiting the distribution to a predetermined central portion of the rolls.

4. In a cereal shredding machine, the combination with parallel pairs of shredding rolls, one pair above another, of a hopper above the first pair and delivering thereto, spouts for guiding the shreds from each pair to the central portion of the next lower pair, agitators arranged to move back and forth from end to end of the effective portion of the rolls which receive shreds, and adjustable fenders near the ends, respectively of the path of each agitator.

5. In a machine of the class described, the combination with a series of sets of rolls mounted above one another, of agitators, for the different sets, respectively, a shaft extending along the different sets and actuating all of them, and a crank mounted above the axis of one set and arranged to drive the agitator shaft, substantially as shown.

6. In a machine of the class described, a combination with a series of sets of grooved rolls mounted above one another, whereby the material of one set passes to the next set, of a hopper for delivering the material to the first set, converging spouts for directing the material from one set to the other set, whereby there may be an accumulation of material at each set of rolls, longitudinally moving devices above each set for intermingling the material before it passes through and is drawn out by the rolls, and fenders limiting the displacement by said devices substantially as shown and described.

7. In a cereal shredding machine, the combination of pairs of shredding rollers one pair above another in the same plane, a hopper delivering material to be shredded to the first pair of rolls, two part converging spouts for massing the shreds received from above and delivering them to the central portion of the succeeding pair of rolls, and an arm arranged to reciprocate along the rolls between the parts of the spout, intermingling the shreds and distributing them across the grooves of the rollers.

8. In a machine of the class described, the combination with grooved rolls arranged to receive stock above, convert it into shreds or filaments, and deliver it below, and sharp edged partitions arranged to separate the product into distinct lots as it leaves the lower rolls.

9. In a machine of the class described, the combination with grooved rolls arranged to

1,024,168

form and deliver sheets or filaments of material, of parallel knife-edged dividing partitions fitting against the delivery side of the rolls, and a conveyer belt parallel to said partitions and having its lateral margins extending under the lower sides of the same, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM E. WILLIAMS.

Witnesses:

R. ROPER,
H. CROON.

W. E. WILLIAMS.

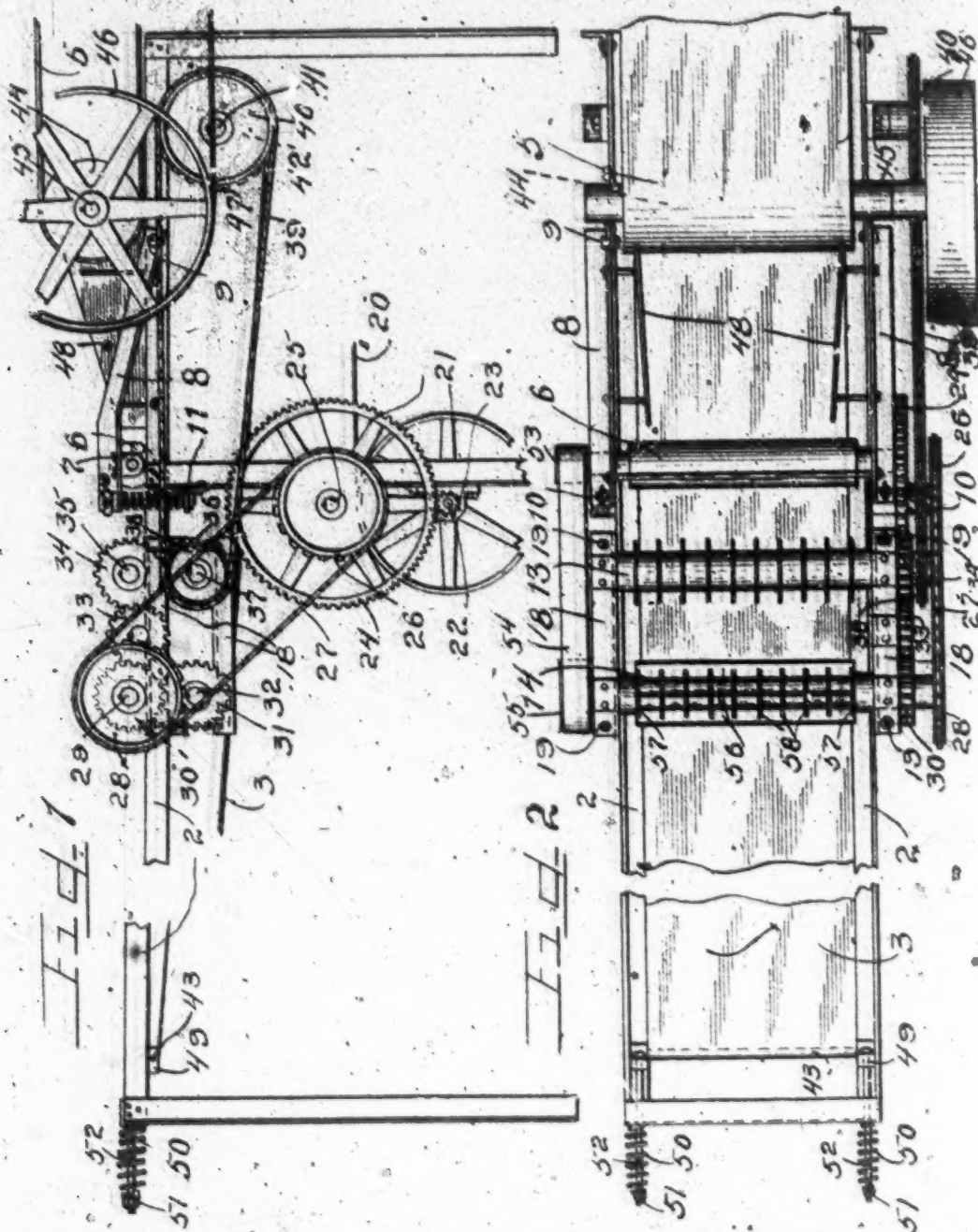
MACHINE FOR MAKING SHREDDED WHEAT BISCUITS OR SIMILAR ARTICLES.

APPLICATION FILED APR. 13, 1908.

Patented May 27, 1913.

1,062,627.

SHEETS-SHEET 1.



WITNESSES

J. H. Angell.
John Grant.

INVENTOR

William E. Williams
by Wallace & Brown
attys.

W. E. WILLIAMS.

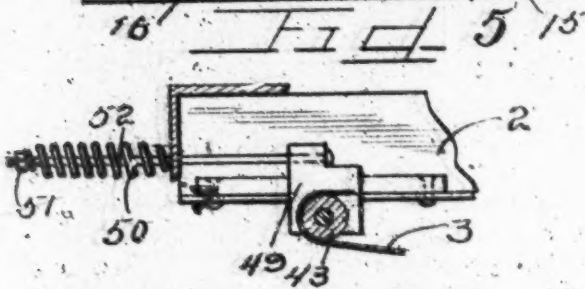
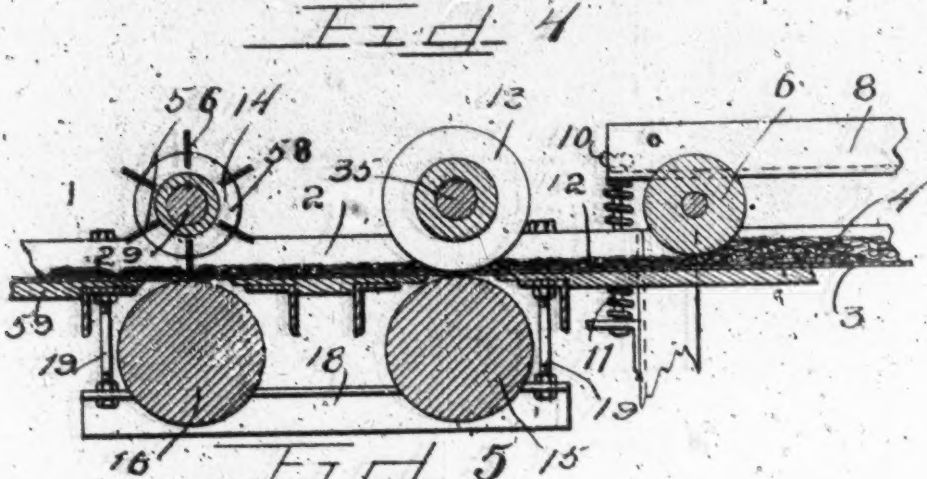
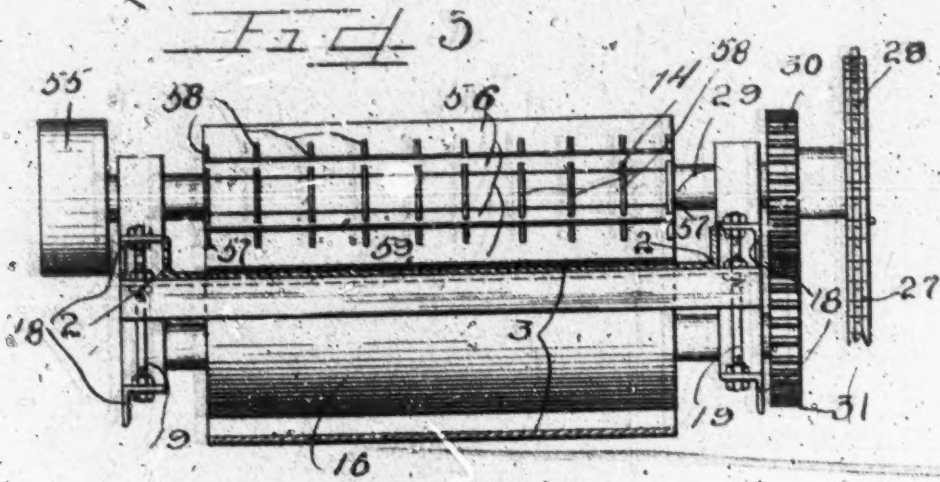
MACHINE FOR MAKING SHREDDED WHEAT BISCUITS OR SIMILAR ARTICLES.

APPLICATION FILED APR. 13, 1903.

Patented May 27, 1913.

2 SHEETS-SHEET 2.

1,062,627.



WITNESSES

J. H. Angell.
John Grant

INVENTOR

William E. Williams.
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UNITED STATES PATENT OFFICE.

WILLIAM ERASTUS WILLIAMS, OF CHICAGO, ILLINOIS.

MACHINE FOR MAKING SHREDDED-WHEAT BISCUITS OR SIMILAR ARTICLES.

1,062,627.

Specification of Letters Patent.

Patented May 27, 1913.

Application filed April 13, 1908. Serial No. 426,813.

To all whom it may concern:

Be it known that I, WILLIAM ERASTUS WILLIAMS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Machines for Making Shredded-Wheat Biscuits or Similar Articles, of which the following is a specification.

The object of my invention is to convert shreds or filaments of wheat or other food stuffs into biscuits or cakes in a rapid, simple, cheap, and desirable way, whereby any desired degree of packing down or matted of the shreds may be secured.

Reference will be had to the accompanying drawings in which:

Figure 1 is a side elevation of the machine. Fig. 2 is a plan view. Fig. 3 is an end section on line 3-3 of Fig. 2. Fig. 4 is a longitudinal vertical sectional view showing the material in process of operation. Fig. 5 is a detail of the belt tightener.

In the drawing 2 designates the frame of the machine which is here shown as made of angle pieces of metal.

3 indicates a traveling carrier belt made of any suitable material or it may be any suitable carrier. This carrier 3 receives the shredded or filamented or other material as it comes from any suitable source of supply in a continuous uniform deposit 4. This source of supply is here shown as an additional carrier belt 5 coming from the shredding machines. The deposit 4 of the shreds passes underneath a roller 6 which pushes the deposit down to any desired thickness or hardness. The roller 6 is carried in bearings 7 carried upon a frame 8 pivoted at 9 to the frame of the machine and is adjusted downward by thumb-screws 10, and is held upward by springs 11. After passing roller 6 the deposit is crushed or matted down into a mat 12 the desired thickness for the biscuit or cracker and the mat then passes underneath a slitting roller 13 which cuts the mat into strips longitudinally. And these strips then pass underneath a cross cutting roller 14 which cuts them transversely and the biscuits or crackers are then taken up by a "peeler" and they pass off automatically on to suitable pans arranged to receive them. Underneath each cutting roller 13 and 14 there is arranged an abutting roller 15 and 16 to receive the thrust of the cutting and the carrier 3 passes between the rollers along

with the material to be cut. The cutting rollers 13 and 14 are mounted in bearings mounted upon bars 18 adjustable to the frame by studs 19 and the rolls 15 and 16 are similarly mounted.

The machine is driven from any suitable source of power by a belt 20 on a wheel 21 on a shaft 22 mounted on posts of frame 2 and carrying a pinion 23 engaging a gear 24 mounted on a shaft 25 which also carries a sprocket 26 driving a chain 27 driving a sprocket 28 on shaft 29 of transverse cutting roll 14. A gear 30 on shaft 29 engages a gear 31 on shaft 32 which is the shaft of roll 16 whereby abutting roll 16 is made to travel in time with its cutter roll 14. An idle gear 33 engages gear 30 and is driven thereby and it engages 34 on shaft 35 which is the shaft of slitting roll 13 whereby, slitting roll 13 is positively driven. Gear 34 engages and drives gear 36 on shaft 37 whereby roll 15 is driven. A sprocket 38 on shaft 37 drives a chain 39 which drives a sprocket 40 on shaft 41 of roller 42 over which carrier belt 3 travels and whereby it is driven. The source of supply belt 5 passes over a roller 44 on a shaft 45 driven by a belt wheel 46 driven by a belt 47 from any suitable source of power. Rends 48 are mounted at the sides of belt or carrier 3 to direct the discharge from belt 5 upon belt 3 within definite side limits which saves waste of the material acted upon. Carrier 3 passes over a small roller 43 at its outer end which roller is mounted in bearings 49 mounted to slide longitudinally in the frame and held by springs 50 to exert an elastic stretch or take-up to carrier belt 3. Springs 50 are adjusted by nuts 51 on rods 52 secured to the bearings 49. Compression roller 6 is driven by a belt wheel 53 driven by a belt 54 driven by a wheel 55 on shaft 29 of roller 14. All of the revolving parts are what are termed live rolls which insure a positive action and does not distort the material acted upon which is a desideratum. Underneath carrier belt 3 there are provided plates or tables 59, which support the carrier underneath the compression roller and also at other points save only where the cutting rollers require apertures for their admission to contact with the carrier belt.

The cutting roller 14 is made of longitudinal slats 56 secured at their ends to disks 57, and supported at frequent intervals by intermediate disks 58 which con-

struction allows cutter blades to be used and yet produce a rigid cutter roller and one cheaply constructed.

The web or mat of material is very fragile and is also more or less sticky and cannot be cut properly by the ordinary mechanisms used in the bakers' art. The separate cutting roller arranged to act on the mat at different points insures against the mat curling up and following the cutter or from being distorted as is the case when ordinary cutting means are used.

What I claim is:

1. In apparatus of the class described, the combination with a table provided with narrow transverse slots, of an endless belt arranged to have one of its folds travel along the surface of the table over said slots, vertically adjustable rollers arranged to rotate in said slots, respectively, below the belt, cutting rollers mounted above the belt in registry with the rollers below the belt, re-

spectively, to divide into separate masses the material passing on the belt, and means for delivering a continuous mass of shreds upon the belt. 25

2. In a machine of the class described the combination of a longitudinal frame supporting sections of a table or flat plates, a carrier belt moving over these tables or plate 30 apertures in these tables or plates, cutting rollers mounted at these apertures to act on the material on the carrier, with a compression roll mounted to act upon the material of the carrier at a point where the carrier 35 is supported by a plate or table.

In witness whereof I have hereunto subscribed my name at the city of Chicago, on this 16th day of March, 1908, in the presence of two subscribing witnesses.

WILLIAM ERASTUS WILLIAMS.

Witnesses:

R. ROPER,

JOHN GRANT.

UNITED STATES PATENT OFFICE.

ASHLEY V. BLACK, OF ST. LOUIS, MISSOURI, ASSIGNOR TO GRAIN PRODUCTS COMPANY,
OF ST. LOUIS, MISSOURI, A CORPORATION OF DELAWARE.

FOOD PRODUCT.

1,210,589.

Specification of Letters Patent.

Patented Jan. 2, 1917.

No Drawing.

Application filed August 15, 1916. Serial No. 115,592.

To all whom it may concern:

Be it known that I, ASHLEY V. BLACK, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Food Product, of which the following is a specification.

This invention relates to a certain new and useful food product.

Bran, and especially wheat bran, has, as is commonly known, great laxative properties, but is, of and by itself, unpalatable and of little or no food value; but I have found that by intimately associating or mixing with the bran certain constituents of agreeable taste and of known food value, I may provide and furnish to the consuming public at relatively low cost a very palatable and nutritious food product possessing and retaining all the laxative effect or property of bran. And my present invention resides in the production and provision of such a food product having bran as one of its essential ingredients.

In Letters Patent No. 1186768, of June 13, 1916, there is described a food product comprising, as its elements, bran and an edible syrup mixed or combined with a previously cooked flour, such as cracker meal. In my present food product, however, I use and combine or mix the bran and edible syrup with what is commercially known as shredded cereal, that is to say, a cereal, such as wheat, corn, or rice, steam cooked in substantially the whole grain, then shredded, and the shreds then baked, shredded cereal being exceedingly nutritious and easily digested, and being substantially different physically from a previously cooked flour, such as cracker meal.

My present food product hence includes, as essential elements or constituents, bran, preferably wheat bran, a shredded cereal, preferably wheat, either in the form of shreds or in the form of ground shreds, and an edible syrup, these several ingredients or constituents being combined or mixed, to obtain the best results, in the proportions approximately of thirty-seven and one-half per cent. bran, twenty-five per cent. shredded cereal, and thirty-seven and one-half per cent. edible syrup.

In producing my present food product, and in providing first the edible syrup, I mix together in a suitable receptacle strained

honey and a sweet syrup, such as molasses, cane syrup, maple syrup, or the like, in approximately equal parts. I then preferably heat this syrup-mixture until the same is of relatively thin consistency, so that it will pour easily. I then, also in a suitable receptacle or mechanical mixer, commingle the bran with, say, approximately half the shredded cereal, then pour into the mixer the relatively thin, hot syrup, and then thoroughly and intimately mix the syrup with the bran and shredded cereal. I then add to the mass in the mixer the remainder or other half of the shredded cereal, and then again mix the several ingredients intimately together, the syrup, in addition to contributing food value and a pleasant sweet taste to the finished product, serving also as a binder for the bran and shredded cereal, the bran being, preferably in the form of flakes and the shredded cereal being, as stated, either in the form of shreds or in the form of ground shreds. The mass or mixture is now ready for toasting or baking, but, that the finished product may be conveniently handled and supplied to consumers, I first mold or otherwise form the mass into suitable individual cakes or biscuits. Accordingly, suitable relatively small or individual molds preferably of somewhat rectangular form or shape being provided and at hand, the same are respectively filled with the described thoroughly mixed and combined ingredients, the material in each mold being suitably compactly pressed therein. The several molds so filled are now reversely placed upon a suitable preferably metal toasting surface, the molds duly removed, and the several so formed cakes or biscuits with their supporting toasting surface placed within a suitable oven, under the heat of which, at approximately 300° F., the several cakes or biscuits are permitted to remain a suitable length of time, approximately thirty minutes, the several cakes or biscuits being thereby baked or toasted, thoroughly sterilized, and relatively hardened. On being removed from the oven, the several food-cakes or biscuits are suitably cooled and are then ready for consumption, my new food-cakes or biscuits being preferably packed and wrapped for shipment in suitable containers, cartons, or the like.

My new food cakes or biscuits are very pleasant to the taste, exceedingly nutritious

and nourishing, and of high laxative value and easily digested, and, further, may be manufactured and produced and supplied to consumers at relatively low cost.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. As a new article of manufacture, the edible biscuit or cake here-in described, the same being composed only of bran, a shredded cereal, and a syrup, intimately mixed together and compactly molded into cake or biscuit form.
2. A manufactured toasted food product composed of bran, a shredded cereal, and an edible syrup.

3. A manufactured toasted food product composed of bran, shredded wheat, and an edible syrup.

4. A manufactured toasted food product composed of bran, shredded wheat, honey, and molasses.

5. A manufactured toasted food product composed of bran, shredded wheat, and an edible syrup, all intimately mixed together in the proportions approximately of thirty-seven and one-half per cent. bran, twenty-five per cent. shredded wheat, and thirty-seven and one-half per cent. edible syrup.

In testimony whereof, I have signed my name to this specification.

ASHLEY V. BLACK.

W. E. WILLIAMS.

METHOD OF MARKING ARTICLES OF THE SHREDDED CEREAL BISCUIT TYPE.

APPLICATION FILED FEB. 21, 1916.

1,263,009.

Patented Apr. 16, 1918.

Fig. 1.



Fig. 2.



Fig. 3.



WITNESS

A. J. Sauer,

INVENTOR.

William E. Williams

BY *Wm. E. Williams*

ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM ERASTUS WILLIAMS, OF CHICAGO, ILLINOIS.

METHOD OF MARKING ARTICLES OF THE SHREDDED-CEREAL-BISCUIT TYPE.

1,263,009.

Specification of Letters Patent.

Patented Apr. 16, 1918.

Application filed February 21, 1918. Serial No. 218,482.

To all whom it may concern:

Be it known that I, WILLIAM E. WILLIAMS, a citizen of the United States, and resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Methods of Marking Articles of the Shredded-Cereal-Biscuit Type, of which the following is a specification, reference being had therein to the accompanying drawing.

Heretofore it has been usual to mark articles of the shredded cereal type by inclosing them in wrappings bearing desired indicia, but when served such articles have been without distinguishing marks. It is common to mark small cakes, crackers and the like by imprinting marks directly upon the material, but practically this method is not available for shredded articles, especially since it is undesirable to disturb the shreds greatly either before or after baking.

The object of this invention is to provide a method of applying to articles of this type indicia which no one will remove or wish to remove before eating the product. This object is reached by treating the shreds lying within a well defined area of the article's surface with or by an agent which will cause them to contrast with the adjacent area, either the treated or the non-treated shreds serving as the mark. This agent may vary in character. A blast of hot air imparts to shreds upon which it is directed a toast-brown color; heat from a branding implement brought into proximity to the article will produce the same change; an air blast, hot or otherwise, may carry any suitable coating or staining matter; such matter may be applied without the aid of an air blast; or the shreds may be slightly crinkled or otherwise mechanically changed in appearance to form a mark.

In the accompanying drawings, apparatus by which the method may be carried out is shown diagrammatically, and the articles formed and marked are also shown, both apparatus and articles being illustrative of the many possible forms which may result from the use of the method.

In these drawings,

Figure 1 is a vertical section of apparatus which may be used.

Fig. 2 shows in perspective an article marked by the use of such apparatus.

Fig. 3 is a similar view suggesting a slightly different marking.

In these figures, A represents a baking chamber, B a drying chamber, C a carrier passing through both chambers, D a shredded biscuit resting on the carrier between the two chambers, E a hopper which may contain any suitable coating or staining agent such as will not interfere with edibility, and F a tube for delivering a blast of hot or cold air downwardly through the hopper's discharge opening. If the biscuit be slowly advanced directly below the discharge opening while coating or coloring or color changing matter is being delivered by the blast, it will be provided with a band G differing in color or shade from the shreds of the surrounding surface. If the amount of material discharged be small and be a powder which will adhere to the hot shreds, the shreds will become of a more or less grayish shade varying with the powder used, as shown at H. If the blast be hot and if nothing be placed in the hopper, the shreds passing under the discharge opening will be made more or less deeply brown, as suggested at I.

The direction of the mark will obviously depend upon the position of the article upon the conveyer.

It is also evident that the biscuit may be at rest while the mark is being applied or may move with the applying device. In the latter case the mark will have the contour of the nozzle or applying device, whether that be the contour of a letter of the alphabet or otherwise but when the article and the applying device do not move relatively during the application of the mark, the marking action should be intermittent or should continue, for any given area to be changed, only during a very brief interval so as to form a spot-like change in appearance rather than a long band. It is also plain that marking heat may be applied by means other than an air blast, and also obvious that the bands shown may be areas made conspicuous by changing the appearance of the shreds outside the limits of the bands instead of within those limits.

What I claim is:

1. The method of causing articles of the shredded cereal type to bear distinguishing indicia which consists in treating the shreds

in a part of the article's surface area by an agent causing the shreds in such area to contrast with those of adjacent parts of the surface area.

5. 2. The method of marking articles of the shredded cereal type which consists in treating the surface shreds of a part of the article's surface with a blast adapted to cause the treated shreds to contrast in appearance with the non-treated shreds.

3. The method of marking shredded ce-

real biscuits which consists in blowing upon the shreds of a part of the article's surface adherent matter changing their appearance.

4. The method of marking shredded wheat biscuits which consists in changing the appearance of the shreds of a portion of the surface, without disturbing the shreds, while leaving adjacent portions unchanged.

In testimony whereof I hereunto affix my signature.

WILLIAM ERASTUS WILLIAMS.

CLERK'S CERTIFICATE.

UNITED STATES OF AMERICA,
EASTERN DISTRICT OF PENNSYLVANIA, } *Sct.:*
THIRD JUDICIAL CIRCUIT,

I, WM. P. ROWLAND, clerk of the United States Circuit Court of Appeals for the Third Circuit, Do HEREBY CERTIFY the foregoing to be a true and faithful copy of the original transcript of record (Volume V., Exhibits) in the case of National Biscuit Company, Plaintiff-Appellant v. Kellogg Company, Defendant-Appellee, No. 5801, on file, and now remaining among the records of said Court, in my office.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the seal of the said Court, at Philadelphia, this eleventh day of August, in the year of our Lord one thousand nine hundred and thirty-seven, and of the Independence of the United States the one hundred and sixty-second.

(Seal)

WM. P. ROWLAND,
*Clerk of the U. S. Circuit Court of
Appeals, Third Circuit.*